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THE RÔLE OF BLOOD TRANSFUSION IN THE TREATMENT OF OBSTETRIC HEMORRHAGE*

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MORTALITY statistics indicate that over 10 per cent of the maternal deaths are due to puerperal hemorrhage, an inclusive term for postpartum hemorrhage, placenta previa, and abruptio placentae. The figure is increased to at least 28 per cent if deaths due to hemorrhage from ectopic pregnancy, abortion, and the accidents of labor (lacerations or rupture of the vagina, cervix, or uterus) are included. The maternal mortality rate in the United States for these various conditions is essentially the same for the years of 1910, 1920, 1926, 1927, and 1928. During a recent four-year period, 246, or 26 per cent, of the maternal death certificates in Chicago have given hemorrhage, placenta previa, abruptio placentae, or ectopic pregnancy as the primary cause of death. Similar figures have been published recently for Philadelphia.

A report of maternal mortality in fifteen states, recently published by Children's Bureau of U. S. Department of Labor, indicates that 11 per cent of the deaths were due to puerperal hemorrhage. Hemorrhage was the direct cause of death in 347 patients with placenta previa, in 374 patients with postpartum hemorrhage, and in 70 patients with abruptio placentae and other similar causes. The committee noted

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that patients with placenta previa were subjected to operative procedures without coincident blood transfusion, although great losses of blood had occurred. They also stated that "transfusion would doubtless have been given more frequently if equipment for blood typing and for giving transfusion had been at hand." They recommended that *all physicians practicing obstetrics give particular consideration to the value of blood transfusion.*

Since May 28, 1931, there have been 22 maternal deaths at the Chicago Lying-in Hospital and 6, or 27 per cent, of these were due to hemorrhage. Three of these patients died from rupture of the uterus, with hemorrhage as a contributory factor. It is evident from these figures that obstetric hemorrhage is of grave import, and despite our voluminous, and occasionally enthusiastic, reports of the treatment of these various conditions, the mortality has not decreased in the past twenty years. What is the explanation for this appalling mortality?

The use of transfusion with a known compatible blood has been possible only since 1910. Why has the modern obstetrician failed to lower the mortality due to obstetric hemorrhage despite the earlier teachings of Blundell and Hicks as to the value of blood transfusion? The answer to this question is that either an insufficient amount of blood is given or too great an interval of time elapses between the hemorrhage and transfusion, with resultant irreparable damage to the vessel walls, brain, and other vital structures because of the anoxemia. If the immediate or primary cause of death in these patients is lack of blood, then the patient should survive when the blood loss is replaced by transfusion.

The physician must have a fair knowledge of such phenomena as water balance, fluid exchange between the vascular system and the tissue spaces, blood and plasma volume, the optimum concentration of hemoglobin, serum protein and fibrinogen, blood pressure and shock, before he can properly treat obstetric hemorrhage. These various important constituents of the blood and physicochemical phenomena are mentioned only briefly, if at all, in the medical curricula. This knowledge is acquired subsequently from practice and usually costs the lives of the patients.

Most obstetric textbooks state that the pregnant woman at term is plethoric and has an increased volume of blood, and that because of this fact a blood loss of 500, 1,000, or even 2,000 c.c. is not of great significance.

Dieckmann and Wegner determined the blood volume, hemoglobin, and many other constituents of the plasma on the *same women* throughout pregnancy. They found that the pregnant woman did not have an increased blood volume, enabling her to withstand a blood loss of 1,500 to 2,500 c.c., as described by Williams, DeLee, and others. The average increase in blood volume was 23 per cent, but due to the patient's gain in weight, there was no increase in the amount of blood per kilo-

gram. Furthermore, after delivery no increase in the amount of blood per kilogram or in the concentration of the hemoglobin was noted. In normal pregnancy it was found that there was a small but definite decrease in the hemoglobin concentration, but an increase in the total amount.

It is difficult to select any constituent of the blood as an important index of blood loss, but a deficiency in hemoglobin content probably manifests itself earlier than any of the others. Therefore, the determination of the hemoglobin should be a part of the prenatal care. Undue emphasis is placed on the erythrocyte count and not enough on the hemoglobin. The erythrocytes should be regarded merely as a taxicab for the hemoglobin, and emphasis should be placed on the

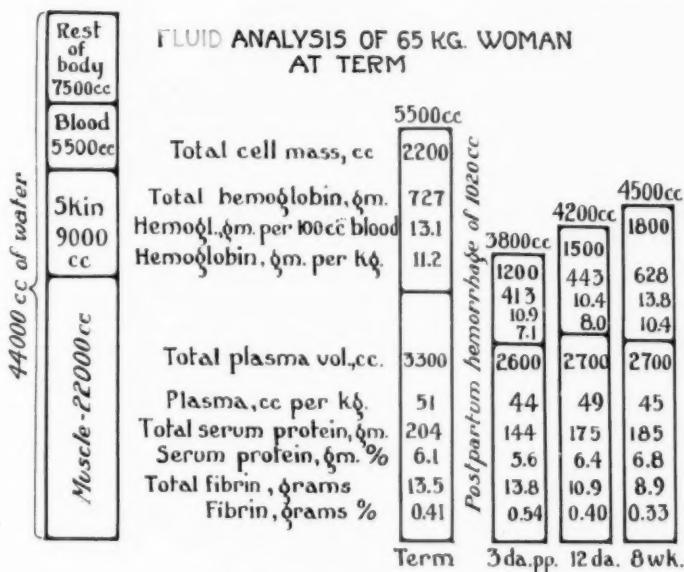


Fig. 1.—Water content of a patient at term weighing 65 kg., and the blood and plasma volumes, hemoglobin and other constituents of the blood during the antepartum and postpartum periods.

determination of the hemoglobin content rather than on the number of erythrocytes. Several investigators have found that the normal hemoglobin for women ranges from 12 to 16 gm., with an average of 14.3 gm. of hemoglobin per 100 c.c. of blood, per 5,000,000 erythrocytes, per hematocrit of 43 per cent. Dieckmann and Wegner found the average hemoglobin in normal pregnant women at term to be 12.4 gm. per 100 c.c. of blood. The hematocrit reading, which is a far more accurate method than the hemocytometer for determining the amount of erythrocytes, was 38.1 per cent.

The hemoglobin determination is part of the routine prenatal examination in most hospitals, but it is just within the past few years

that the work of Kerwin, Moore, Galloway, Bland, and others has indicated the importance of routine determinations. In 1931, Adair made it a rule of the Chicago Lying-in Hospital that every patient must have a hemoglobin determination. During a six-month period, 23 per cent of the prenatal patients had a hemoglobin content under 10 gm.

The water content of a patient at term weighing 65 kg. is shown in Fig. 1. It is apparent from the graph that the blood volume forms only a small part of the total fluid. If the amount of water is increased at one point, it is soon carried away by the blood and either distributed evenly throughout the body tissues or excreted by the kidneys, lungs, bowels, or skin. The blood and plasma volumes, hemoglobin and other constituents of the blood during the antepartum and postpartum periods are also shown in Fig. 1. It is notable that a measured blood loss of 1,020 c.c. produces marked changes in the blood and plasma volume and in the concentration and total amount of hemoglobin, hematocrit, serum protein, fibrinogen, etc. This patient was not transfused because of the study but was watched very closely. A relatively rapid increase of the plasma volume, serum protein, and fibrin, but a slow return of the hemoglobin and blood volume to normal may be noted.

The immediate effect of loss of blood from the vascular system is a parallel decrease of all of the constituents of the blood, thus producing no change in the relationship of hemoglobin to cell count or cell volume. The blood volume is a constant for the individual and if a reduction occurs, a compensatory increase in the plasma volume takes place and persists until new hemoglobin has been produced. The plasma is increased by the passage of fluid and some serum protein from the tissue spaces into the blood stream. Adolph and coworkers state that after a hemorrhage in dogs the mean rate of plasma dilution per minute amounts initially to about 0.25 c.c. per kilogram. These phenomena are demonstrated by the data given in Fig. 1 and Table I.

Table I (Keith, 1917) also demonstrates the rapid increase of the plasma volume but a slower return of hemoglobin and blood volume. This patient was a soldier with a simple comminuted fracture of the left femur. A large hematoma of the left thigh developed, with no external bleeding.

TABLE I. M. M.*

DAY	BLOOD VOLUME		PLASMA VOLUME		HEMO- GLOBIN	HEMATOCRIT
	TOTAL C.C.	C.C. PER KG.	TOTAL C.C.	C.C. PER KG.		
1	4000	64	2525	69	83	37
2	4420	71	3025	83	74	31
4	4560	77	3375	96	63	26
7	4760	80	3710	106		22
12	5400	89	3730	105	68	31
16					81	33
22	5550	96	3440	100	97	38

*Taken from Keith, 1917.

A syndrome, generally known as "shock," frequently occurs after hemorrhages or difficult deliveries, especially when attended by hemorrhage. When the various conditions which may cause shock are analyzed, the reduction of the blood pressure and of the circulating blood volume is common to all. Either one of these may be the primary change, the other secondary. Absolute loss of blood volume is the primary change in hemorrhage. The blood volume is also decreased in shock not due to hemorrhage from the vascular system. Obviously, the phenomena of shock and hemorrhage are similar.

Blalock states that because of the decrease in blood volume incidental to the hemorrhage, a compensatory vasoconstriction maintains the arterial blood pressure at or near the normal level. If the blood volume continues to diminish, the blood pressure decreases even though vasoconstriction is maintained. If the blood pressure remains depressed for a considerable length of time, the vasoconstriction mechanism fails and vasodilatation results. He also states that transfusion is of no avail in animals with vasodilatation. Blalock concludes that "an increase in the concentration of the blood, a negative response to transfusion, and marked alteration in the tissues of the body can be produced by hemorrhage."

Keith and Cannon, on the basis of clinical observation and the degree of blood volume reduction, have grouped patients in shock into compensated, partially compensated and uncompensated. The salient findings in the latter group, which is the most serious, are as follows:

If the hemorrhage equals or exceeds one-third of the blood volume, certain new factors are introduced which prevent the reformation of the blood volume by an increase in the plasma. These new factors have to do primarily with the sudden diminution in blood volume rather than a hemoglobin deficiency, because by repeated small hemorrhages the hemoglobin may be decreased to 20 per cent of the normal without any untoward symptoms. A massive hemorrhage results in a sudden and marked drop in blood pressure, inefficient circulation and stagnation of the blood in the capillaries. These patients are dangerously ill. They are restless, very thirsty, vomit frequently, and their extremities are very cold. The pulse is imperceptible and the systolic blood pressure may be decreased to 60 mm. Hg or less. The heart rate on auscultation ranges from 120 to 180. A heart rate below 100 occasionally occurs in this type of patient and is almost invariably fatal. The blood volume is below 65 per cent.

Because of the inefficient circulation, anoxemia results and changes occur in the vessel walls which permit not only fluids but also plasma protein to pass out. Thus a vicious circle is produced, i.e., the hemorrhage causes a decrease in blood volume which results in shock, which, in turn, causes a further reduction in blood volume, and so on. If hemoglobin or erythrocyte determinations are made on cutaneous blood, the results are usually much higher than if made on venous blood because of the capillary stagnation. Thus, despite the hemorrhage, the paradoxical situation of a rapidly increasing hemoglobin,

cell volume and cell count of either cutaneous or venous blood, especially the former, arises and indicates progressively increasing shock and a poor prognosis.

Significant relationships between the systolic or diastolic blood pressure and pulse rate have been reported by various investigators, but it must be emphasized that no rule holds true for all cases. The pulse pressure is approximately one-half of the diastolic and one-third of the systolic pressure. It should always be 30 mm. Hg or more. McKesson states that if it is 20 mm. or less for more than twenty minutes, the patient either dies at once or within three days (because of pathologic changes in the brain cells produced by the cerebral anemia). A systolic blood pressure of 80 or less is of serious import.

Archibald and McLean state that of 17 soldiers with the systolic pressure below 75, only three rallied, and they also died later. They conclude that the diastolic pressure is the most important, and that it must be raised by treatment if recovery is expected. Phemister and coworkers conclude that "in states of circulatory depression, the blood pressure is an inadequate index of the seriousness of the condition." They state further that if an operation is performed on an animal which has its blood volume reduced by hemorrhage or trauma, a further minimal hemorrhage might result in death. In patients with hypertension, the systolic and diastolic pressures may drop 50 to 150 mm. within a few minutes, and even though they may still be within the normal limits, the patient will present all the features of severe shock because the pressure is abnormally reduced for that individual.

It is evident that hemorrhage has many physiologic effects, which Adolph and coworkers summarize as follows:

The primary effects of loss of blood from circulation are to decrease the rate of blood flow and oxygen flow to most tissues. To this situation the circulation responds by increase in heart rate, discharge of adrenalin, discharge of blood from the spleen, local vasoconstrictions, and local persisting ischemias. The respiration responds to the local asphyxia in its centers and to the pouring of lactate into the circulation by hyperventilation, followed eventually by asphyxia and cessation of breathing. In the capillaries, fluid flows into the blood from tissue spaces, water excretion by the kidneys is diminished, and various dissolved constituents interexchange in response to the lowered pressures, to the anoxia, and to the altered types of tissue metabolism.

The potential indication for blood transfusion in a patient with an obstetric hemorrhage is a hemoglobin which we have arbitrarily set at less than 10 gm. per 100 c.c. of blood. Obviously, a hemoglobin estimation immediately after a hemorrhage is of little value. It may even be increased due to shock. The ideal criterion would, therefore, be the blood volume, but since its determination is impractical, the best guide is the patient's clinical condition and the blood loss. We have been making accurate determinations of the hemoglobin loss at delivery and cesarean section. The average blood loss in a low cervical cesarean section is 539 c.c., with a range of from 100 to 1,430 c.c. Our rule is to estimate the blood loss and multiply it by two or by three,

if the patient's hematocrit is 30 per cent or less. The patient should be transfused if the blood loss can be determined with a reasonable degree of accuracy and amounts to 20 per cent or more of the blood volume, providing that her hemoglobin was more than 10 gm. at the onset. Transfusion is imperative if the hemoglobin was less.

Many patients who have been bleeding for several days may enter the hospital apparently in good condition, but before any manipulation or examination is carried out which might cause further bleeding, a transfusion should be given. The reason for this is that with a slow hemorrhage the hemoglobin can be decreased to as low as 2.8 gm., or 20 per cent of the normal. These patients are quite likely to die if any additional blood is lost. A sudden blood loss entailing 40 to 50 per cent of the hemoglobin usually ends fatally.

There is a slight hemoconcentration in normal pregnant women during labor. The hemoglobin and other constituents may increase 25 per cent in toxemic patients as a result of the concentration. Anesthesia intensifies these phenomena. Therefore, the blood lost at delivery may, and often does, contain a greater concentration of hemoglobin than would be expected from a determination of hemoglobin which had been made during pregnancy or early in labor.

Attention must be given to the patient's weight in correlating blood loss with clinical conditions. It is obvious that a blood loss of 1,000 c.c. from a patient weighing 50 kg. and having a blood volume of 4,000 c.c. is of more serious import than the same amount from a woman weighing 70 kg., with a blood volume of 5,600 c.c. A large amount of serum protein and fibrin is lost in addition to the hemoglobin if the hemorrhage is severe. A certain concentration of these substances is essential for the proper functioning of various organs and the exchange of water in the tissues.

Five to ten days are required for the return of the serum protein to normal. Fibrinogen, one of the components necessary for blood coagulation, requires one or two days for regeneration. If the patient has had a marked hemorrhage and is given sufficient fluid for the blood volume to return to normal, it occasionally happens that the fibrinogen concentration is so low that proper coagulation does not occur, thus permitting the bleeding to continue. A low concentration of fibrinogen may be a factor in the continued hemorrhage or oozing observed in certain cases of abruptio placentae and postpartum hemorrhage.

Transfused blood, as far as we are able to determine, functions just as well as the patient's own blood. The longevity of the erythrocyte in man ranges from eighteen to one hundred days, with an average of thirty days. The transfused erythrocyte, both in vitro and in vivo, functions normally, and its life is apparently not shortened. Serum protein, fibrinogen, and platelets also function in a normal manner in

the new host. If the plasma protein concentration is increased above the normal for that individual as a result of the transfusion, the excess amount disappears from the blood stream within seventy-two hours.

The hemoglobin concentration on the day following a transfusion is occasionally lower than it was before. Krogh and others have demonstrated that only 40 to 50 per cent of the capillaries are normally open at any time, and still fewer are open in patients with a decreased blood volume. Furthermore, with a deficient blood volume there would be a decreased bore of the arterioles because of the vasoconstriction. Following the transfusion, the arterioles dilate and more capillaries open up; thus, although the total amount of hemoglobin is increased, the concentration is decreased.

A summary of our transfusions and data from selected cases will illustrate the results and methods of treatment. From May 28, 1931, to Sept. 30, 1934, there have been 8,998 deliveries at the Chicago Lying-in Hospital, in which more than 274 transfusions have been given. Because of technical difficulties in the Record Room, we were unable to have access to all of the blood transfusion charts, but believe that we have at least 90 per cent of them. From June 1, 1928, to May 27, 1931, at the old Chicago Lying-in Hospital, in 8,672 deliveries, only 22 patients received transfusions. The average amount of blood transfused was 403 c.c. A comparison of data is difficult. The blood loss of the patients in our series may have been greater than those in the old hospital, or their blood volume may have been lower, or we are better prepared to transfuse. The ability to transfuse rapidly, repeatedly, and safely is sufficient reason for the large number of trans-

TABLE II. TRANSFUSIONS AT THE CHICAGO LYING-IN HOSPITAL

CONDITION	NUMBER OF		AVERAGE AMOUNT OF	
	PATIENTS	TRANSFUSIONS	PATIENT	TRANSFUSION
<i>Obstetric Cases</i>				
			c.c.	c.c.
Postpartum hemorrhage	33	41	748	602
Placenta previa	22	29	824	670
Abruptio placentae	13	25	1183	615
Operative hemorrhage	14	25	1035	660
Abortion	10	12	685	570
Chorionepithelioma	1	11 (6 wk.)	7000	636
Anemia of pregnancy	21	39	1054	568
Infection, ectopic pregnancy, etc.	18	32	909	525
Total	132	214	919	608
<i>Gynecologic Cases</i>				
Uterine myomas	16	28	1026	588
Menorrhagia	10	11	635	577
Carcinoma of uterus	5	9	1010	561
Infections, shock and post-operative hemorrhage	11	14	755	582
Total	42	62		

fusions. The routine hemoglobin determination enabled us to detect a severe grade of anemia in 21 patients who were given 39 transfusions. The total maternal mortality is slightly less in the new than in the old hospital, and there have been no fatalities in the new hospital, either immediate or remote, due to blood transfusion.

The data for the transfusions given are listed in Table II, which illustrates the value of large and repeated transfusions, particularly the amount of blood given to each patient for the various conditions. Thus the average amount of blood per transfusion is 608 c.c., and the average per patient is 919 c.c.

Most normal adults can tolerate a blood loss of 500 c.c. Therefore, 600 to 800 c.c. of blood should be the amount of the transfusion in patients with evidences of hemorrhage. The transfusion may have to be repeated one or more times if the hemorrhage has been massive.

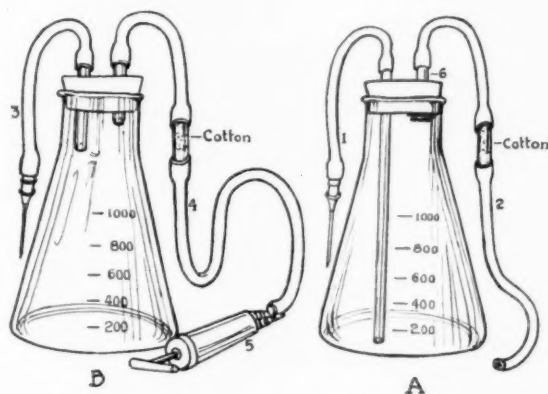


Fig. 2.—Flasks equipped for taking the blood.

Our technic of the treatment of severe anemia, whether due to acute or chronic blood loss from obstetric hemorrhage or blood dyscrasia, is described in the case reports.

METHOD

The method for citrate blood transfusion is as follows: 50 c.c. of a 4 per cent solution of sodium citrate (U.S.P. VIII—this number is very important) are used for amounts of blood ranging from 400 to 700 c.c. Although this amount of citrate will inhibit clotting in 1,000 c.c. of blood, if more blood than 700 c.c. is to be withdrawn, another 10 c.c. of citrate solution are added. In a case of purpura hemorrhagica in which bleeding continued from an operative incision, despite citrate transfusion, whole blood was transfused by the multiple syringe method.

The transfusion set consists of the bottle, rubber tubing, needles, syringes, and citrate solution, all of which have been properly wrapped together and autoclaved. The bottle for taking the blood is equipped as in Fig. 2, A. It is placed in a pan of water at 41° C.; the top of the bottle must be below the level of the arm. The suction tube (1) for the donor is 10 inches long and of one-eighth inch bore. The

citrate solution, using mouth suction, is drawn into the bottle and then a 15 or 16 gauge needle is inserted into one of the arm veins, *pointing away from the heart*. The flask is given a rotary shake with every 100 c.c. of blood. Usually 700 c.c. of blood can be aspirated in five to ten minutes. The flask is then fitted as in Fig. 3, *C*, the rubber tubing (8) which is 6 feet long and of five-thirty-seconds inch bore is immersed in a pan of water at 40 to 42° C., and a 17 or 18 gauge needle inserted into the recipient's arm, pointing toward the heart. The first 50 to 100 c.c. are injected over a period of three to five minutes, and if the patient complains of tingling, body pains, precordial oppression, or extreme anxiety the rate of injection is slowed. If the patient complains of pain in the lumbar region or tightness in the chest, or if cyanosis, dyspnea, edema, a slow thready pulse, chill, fever, delirium, or coma are noted the transfusion must be stopped at once, and the typing and matching rechecked. A drop of alcohol in the long glass suction tube (7) indicates whether or not the blood is running. In children and in patients with collapsed veins, the

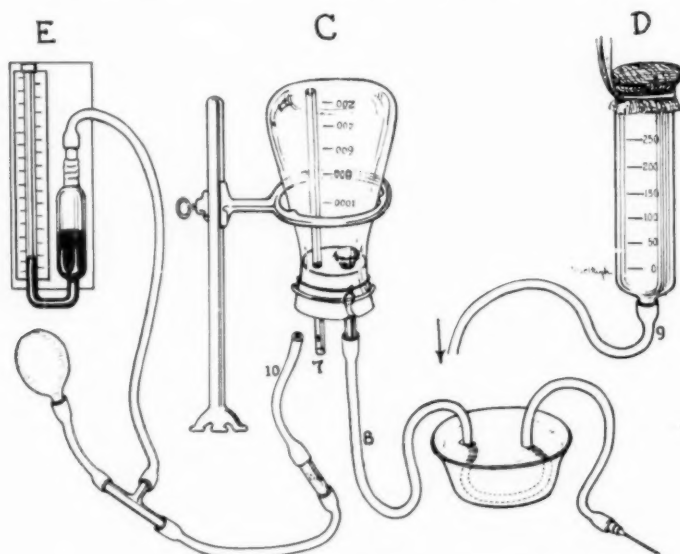


Fig. 3.—Set-up for giving the transfusion.

blood pressure manometer (*E*) may be connected (10 to 7) with the transfusion bottle and 150 to 200 mm. of mercury pressure used to force the blood in. The blood can also be removed from the bottle and poured into a salvarsan flask (*D*). In cases of severe hemorrhage and shock in which intravenous glucose or saline solution and repeated blood transfusions are necessary over a period of hours, the blood may be poured into the salvarsan flask. If this latter procedure is to be used, the set-up illustrated in Fig. 2, *B* will be found more convenient for obtaining the blood. Suction can be made with the mouth or a pump (5). The transfusions can be performed in the operating room or in the patient's home. No other set-up than that described is necessary.

CASE REPORTS

CASE 1.—Abruptio placentae (Table III). The patient was delivered by cesarean section. A stillborn fetus was removed, with a blood clot measuring 700 c.c., which represents at least 2,000 c.c. of blood. The uterus contracted well and the hemorrhage at time of operation was minimal; the patient was in shock. Subsequently,

TABLE III. ABRUPTIO PLACENTAE

TIME	TEMPERATURE	PULSE	BLOOD PRESSURE	REMARKS	TREATMENT			DATE	BLOOD DETERMINATIONS			
					20% GLUCOSE INTRAV. C.C.	BLOOD TRANS- FUSION C.C.	RINGER'S SOL. HYPODER- MOCLYSIS C.C.		HEMO- GLOBIN GM. %	HEMA- TOCRIT %	SERUM PROTEIN %	FIBRIN %
9/3/33: 3:00 A.M.				Sudden abdominal pain. Vaginal hemorrhage of 200 c.c.				9/3/33	6.8	22.5		0.161
4:30 A.M.	36.4	112		Patient pale and ill. Uterus hard. No F.H.T.				9/4/33	7.7	22.5	5.0	0.440
5:45 A.M.		120	100/?	Exsanguinated. Uterus large, tender, and does not relax				10/2/33	10.6	36.0	8.7	
6:40 A.M.			108/?	Cesarean section	800	800		11/9/33	13.0	43.0		
7:30 A.M.				Air hunger, shock		600	2000					
11:00 A.M.		86	130/85		500							
1:20 P.M.				Persistent hemorrhage, subtotal hysterectomy	200	900	1000					
6:30 P.M.	37.0	84	145/85									
9/4/33: 6:00 A.M.	38.2	96		Fluid intake 9350 c.c. 24-hour output 1250 c.c.								

TABLE IV

TIME	BLOOD PRESSURE	PARENTERAL FLUID	REMARKS	HEMOGLOBIN GM. PER 100 C.C.	HEMA-TOCRIT %	SERUM PROTEIN GM. %
12:30 A.M.						
First day 4:45			Patient delivered			
			Admitted to hospital in shock, extremities cold, no radial pulse. Infundin M III intravenously.	6.9	23	
5:15		1000 c.c. 20% glucose over 90 min. 2000 c.c. Ringer's sol. by hypodermoclysis		6.2	22	3.9
5:30	74/40					
6:15	50/?		Patient awake. Placenta expressed by modified Crede method.			
6:30	70/46		Adrenalin 0.5 c.c. intramuscularly			
6:45	74/40	500 c.c. 6% acacia sol.				
7:30	72/42	700 c.c. blood				
9:10		500 c.c. 5% glucose				
9:45	75/50	500 c.c. 6% acacia sol.	Uterus packed			
			Adrenalin M III intravenously. Ephedrine 0.03 subcutaneously			
10:45	82/50	850 c.c. blood				
11:15	100/62	1000 c.c. 5% glucose				
1:30 P.M.	110/70		12-hour intake 12,000 c.c. Output 4,300 c.c.	7.5	23	3.4
Second day			24-hour intake 13,000 c.c. Output 5,000 c.c.	7.5	24	4.0
Third day		750 c.c. blood		6.9	21	4.1
Fourth day				8.4	27	4.7
Eighth day				9.2	28	5.5
Nineteenth day				9.9	30	6.2

she began to bleed and a subtotal hysterectomy was performed five hours later. Note: (1) the large amount of blood which was given in twelve hours without any change in hemoglobin or hematocrit; (2) the large fluid intake with a comparatively small output; (3) the very low fibrin content (normal 0.3 to 0.5) which was a probable factor in the constant oozing; (4) the low serum protein due to the restoration of the plasma volume to normal, but the inability of the body to maintain a normal concentration of proteins because of the excessive loss by hemorrhage.

CASE 2.—Intrapartum and postpartum hemorrhage (Table IV). This patient was delivered at home by a private physician. Note (1) the primary treatment for shock and hemorrhage; (2) the tremendous fluid intake required to maintain the blood pressure; (3) the hemoglobin only increased from 6.2 to 8.4 gm. per 100 c.c. despite the transfusion of 2,300 c.c. of blood in forty-eight hours; (4) the abnormally low serum protein due to the excessive hemorrhage and resultant plasma dilution; (5) the more rapid return of the serum protein to normal.

CASE 3.—Spontaneous rupture of the uterus. The patient was in labor and at term. The rupture occurred at 11:35 P.M. There was no palpable radial pulse or audible blood pressure. Between 11:50 P.M. and 12:45 P.M. the fetus and uterus were removed; she was given two transfusions each of 500 c.c. of blood, 1,200 c.c. of 20 per cent glucose solution intravenously, and 700 c.c. of saline solution by hypodermoclysis. Seven hours later the pulse was 140, the blood pressure 90/70, and respirations 36. She received another transfusion of 600 c.c. of blood and 700 c.c. of glucose solution intravenously. The hemoglobin was 10.6 nine days before labor, and thirty-six hours after labor, despite the transfusion of 1,600 c.c. of blood, it was 8.8 gm. Recovery was uneventful.

CASE 4.—Severe anemia of pregnancy (Table V). The patient did not have a hemorrhage from any source. She was given 4,600 c.c. of blood during a period of twenty-four days. A normal infant was delivered at term and up to the present time the anemia has not recurred. Note (1) the relatively constant plasma volume, but the marked increase in the cell mass; (2) the hemoglobin per kilogram was ex-

TABLE V. SEVERE ANEMIA OF PREGNANCY

L. H. #54736

DATE	HEMO- GLOBIN GM. 100 C.C.	HEMATO- CRIT %	ERYTHRO- CYTES MILLIONS	HEMO- GLOBIN GM. KG.	BLOOD VOLUME C.C.	PLASMA VOLUME C.C.	BLOOD TRANS- FUSION C.C.
1932							
2/10	8.1		2.64				
4/18	6.4		1.70				
4/27	5.1	16	1.75	3.3	3910	3290	600
5/ 5	6.2	20	2.24				600
5/ 9	7.2	23					700
5/13		32					700
5/16	8.8		2.58				700
5/20	11.0		2.90				600
5/26							700
6/ 7	11.5 (delivery)	33	3.64	9.0	4780	3200	
7/19	11.6	37		9.1	4140	2610	
10/18	11.7	35	4.50	10.5	4620	3000	
12/ 5	13.4	39	3.33	14.7	5640	3440	
10/23/33	12.2	39	3.70				
11/19/34	10.5	36	3.93				

tremely low, and indicates the marked anemia better than the hemoglobin concentration; (3) the hemoglobin per kilogram did not reach normal limits until after the seventh transfusion.

CASE 5.—Pregnancy complicated by severe purpura hemorrhagica (Table VI). Note that large transfusions increased the hemoglobin, platelets and serum protein to a low normal despite a massive postpartum hemorrhage.

TABLE VI. SEVERE ANEMIA OF PREGNANCY DUE TO BLOOD DYSCRASIA

M. S.

TIME	HEMO- GLOBIN GM. 100 c.c.	HEMATO- CRIT %	SERUM PROTEIN GM. %	PLATELETS	ERYTHRO- CYTES MILLIONS	BLOOD TRANS- FUSION C.C.
First day	3.5	10	5.0	22,000	0.95	
Second day	3.5	10		19,000	1.69	800
Third day	6.7	18	5.6	28,000	1.98	600
Third day	(Delivery, postpartum hemorrhage 1000+ c.c.)					
Third day	7.5	22			2.40	800
Fourth day	8.6	26	4.7	40,000	2.66	600
Fifth day	9.5	30	5.0	51,000	3.41	800
Twelfth day	10.8	33	6.0	116,000	3.60	
						Total 3600 c.c.

COMMENTS

After a severe hemorrhage, while a donor is being obtained, the body must be kept warm by the application of external heat (electric baker). Saline or Ringer's solution should be given by hypodermoclysis, using 16 gauge needles. A 20 per cent solution of glucose may be injected intravenously. After 200 to 300 c.c. of glucose solution have been given, the rate of injection should be as slow as possible, yet maintaining the blood pressure. Five hundred cubic centimeters of 20 per cent glucose solution can be given intravenously in twenty to forty minutes without danger, but in patients who have had large hemorrhages, *more than this should never be given* unless the patient is to receive 600 c.c. or more of blood. Failure to observe this rule may result in the death of the patient. Twenty per cent glucose solution in amounts of 1,000 c.c. or more prolongs the coagulation time of the blood and because of its hypertonicity it draws large amounts of fluid into the circulation. This exhausts the reserve depots of fluid, and if further hemorrhage occurs there can be no increase in plasma volume.

The citrate method of transfusion is the only one suitable in obstetrics because of the necessity of speed. The methods used by us are modifications of those described by Kolmer, Hartman, Lewisohn and others and have been instituted to save time. In an emergency transfusion, we insist that the blood must be in the recipient's circulation within thirty to forty minutes, depending on the time required to obtain a donor. Eight hundred cubic centimeters of blood have been

taken and injected into the recipient in eleven minutes, but the average time required is twenty to thirty minutes.

There are *two dangers* associated with blood transfusion: (1) The immediate danger of an incompatible blood, in which case the patient almost invariably dies if more than 200 c.c. are injected. (2) The delayed danger of a severe reaction, or no reaction, without question of incompatibility, but characterized by an oliguria or anuria.

In 276 transfusions, chills occurred in 20 patients, and nausea, vomiting, urticaria, or pain in the chest or lumbar region in 10. Three patients received incompatible blood, the amounts varying from 50 to 100 c.c. Fortunately, all of these patients were conscious and at the first complaint of pain in the chest or lumbar region, the injection was stopped, the matching rechecked, and the blood found to be incompatible. A hemoglobinuria and partial oliguria developed, but none of the patients died. Renal function tests before discharge from the hospital showed no evidence of impaired renal function. Large amounts of intravenous glucose were given to these patients to produce a diuresis. Two of the transfusions were given by one man who, it should be noted, was careful and conscientious.

Typing serums purchased from reliable firms should be checked periodically. In a two-year period we had some impossible results on two occasions, and the Type III serum was found to have deteriorated to such a degree that agglutinins could not be demonstrated. This can be avoided by checking the serums or by using the Brem method of blood typing, in which the fresh cells and serum of a known Group II or III are matched with the serum and cells of the unknown.

The donor's cells should be matched with the recipient's serum, in addition to the determination of the blood group. There must be no agglutination or clumping at the end of thirty minutes at room temperature. The slide, plate or test tube (macroscopic technic) must be agitated periodically in order that one may be certain that the cells can move freely. *A sufficient number of cells must be used so that agglutination can occur and, most important, be detected.* One of the authors (W. J. D.) uses either a microscopic or a macroscopic method for determining the type, but insists on a macroscopic matching* of the donor's cells and the recipient's serum, and watches for agglutination and/or hemolysis.

Rouleaux formation occurs to such a degree in patients with puerperal infection, probably because of the high fibrinogen, that the donor is usually reported as incompatible. An experienced serologist can usually distinguish between agglutination and rouleaux formation. Aging of the serum for two or three days decreases its rouleaux-forming properties.

*Three-tenths cubic centimeter of the recipient's serum, 0.3 c.c. of 1 per cent sodium citrate in saline and 3 drops of the donor's blood are placed in a test tube.

The value of proper control of all transfusions is exemplified by the following: On the Obstetric Service of Washington University, during a period of six years ending in 1929, 147 patients were given 302 transfusions. The senior author was in direct charge of all transfusions for the greater portion of this period. No patient received an incompatible blood, and no deaths occurred because of a reaction. One patient had a marked oliguria, but recovered. The average amount of the transfusion was 602 c.c., and the largest was 850 c.c. One patient was given 9 transfusions (by Dr. T. K. Brown), a total of 7,150 c.c. of blood in four weeks. Transfusions by the citrate method, in which the blood was dropped from a needle into a container containing the anticoagulant, without careful supervision of technic, were followed by reactions (chill or temperature elevation of 2° or more) in 45 per cent of the cases. With the new method as described in this paper, in which suction was used to obtain the blood in a closed container and under careful supervision, the number of reactions decreased to 14 per cent. In 32 transfusions for all types of disease in patients of various ages, one of the authors (W. J. D.) observed no reactions. Dr. T. K. Brown has been in charge of the transfusion service since 1927, and if both periods, comprising 12 years, are combined, 877 transfusions have been given without any deaths attributable to an incompatible blood.

We have always preferred Group IV (Moss) donors because their cells contain no agglutinogens and, therefore, they cannot be clumped. This is an additional safeguard because a mix-up may occur in the laboratory, irrespective of elaborate checkings. In fact, the best check is for the physician himself to match the patient's serum and donor's cells (both obtained by him at that time) just prior to the transfusion. It is noteworthy that Dr. George Ives of St. Louis has performed personally more than 2,500 transfusions and attributes his success to personal supervision of typing, matching, preparation of the citrate solution, and to a preference for the Group IV (Moss) donor.

The treatment of a patient who has received an incompatible blood is as follows: Adrenalin and ephedrine for the shock, and adequate amounts of hypertonic glucose solution given intravenously to maintain a urinary output of at least 30 c.c. per hour. If more than 200 c.c. of blood have been given, the patient should receive sodium bicarbonate in sufficient amounts to produce a urine which is alkaline to brom-cresol-purple. This will necessitate 24 to 40 gm. by mouth, or the intravenous injection of 300 to 500 c.c. of a 4 per cent solution, as needed. If the blood is compatible, but an oliguria or anuria has developed, only hypertonic glucose should be given in an amount and concentration necessary to produce a secretion of urine.

CONCLUSIONS

1. Obstetric hemorrhage is responsible for more than 10 per cent of the maternal deaths. The mortality has not decreased in the last twenty years despite the use of blood transfusions. If the maternal deaths due to hemorrhage from abortion, accidents of labor, and ectopic pregnancy are included the rate is increased to 28 per cent.

2. Hemorrhage decreases the blood volume and if massive enough initiates shock, resulting in death of the patient unless prompt treatment is instituted.

3. Some of the important constituents lost as the result of hemorrhage are water, hemoglobin, serum protein, and fibrinogen. They can be replaced by blood transfusion and parenteral fluid, and will function, so far as is known, as well as the patient's own blood and fluid.

4. The blood loss during hemorrhage is usually underestimated. It should be correlated with the patient's hemoglobin and blood volume or weight.

5. The citrate method of blood transfusion is ideal in the practice of obstetrics.

6. The mortality rate from obstetric hemorrhage can be lowered only if sufficient blood is transfused to raise and maintain the hemoglobin to approximately 10 gm. per 100 c.c. of blood.

7. The transfusion must be adequate in amount and must be given within a short time after the hemorrhage. Further transfusions may be given within a period of hours or spread over several days, depending on the amount of blood required and the clinical condition of the patient.

We are indebted to Dr. T. K. Brown and Dr. George Ives of St. Louis, Mo., for permission to use some of their data, and also for their many suggestions which have improved the technic for citrate blood transfusion.

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THE SURGICAL TREATMENT OF OVARIAN DYSFUNCTIONS*

A CLINICAL AND PATHOLOGICAL STUDY

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THE surgical treatment of properly selected cases of ovarian dysfunction is based upon histopathologic studies and clinical observations which prove that if a dysfunction repeats itself too frequently and forcibly, or if it persists for too long a time, the initial imperceptible structural alterations will ultimately develop into definite and permanent organic entities. This concept of physiologic pathology is gaining ground in all branches of medicine and causes the dogma, that functional diseases have no organic basis, to be relegated to the scrap heap of obsolete theories. Structure and function are indissolubly linked to each other.

In studying ovarian dysfunctions pathologically and clinically for a number of years, I became convinced that patients suffering from so-called ovarian hyper- or hypofunction for a long period of time, will present on careful bimanual palpation an enlargement of either one or both ovaries. If such patients have already been treated with endocrine preparations for a considerable period and, in the cases of ovarian hyperfunction with excessive uterine bleeding, have been curetted on a number of occasions, without relief, then a unilateral or a bilateral partial ovarian resection is indicated.

The validity of this radical procedure must be proved further by the following tests: (a) Does it render the expected therapeutic results in a fairly large proportion of cases? (b) Does the pathology of the resected ovarian tissue bear a sufficient correlation to the dysfunction in question? (c) Do the therapeutic results correspond to our present knowledge of interglandular correlations and of the influence of the vegetative nervous system upon the generative organs?

The material selected for this study was subjected to this searching analysis, especially the pathologic and clinical phases, and to facilitate this inquiry I have followed the accepted didactic classification of ovarian dysfunctions into hyper- and hypofunctions. I am fully aware of the scientific pitfalls to which such an arbitrary classification is heir, but until we possess means and methods of evaluating with physiologic accuracy the degree of disturbance in the primary and in the secondary endocrines involved in each type of dysfunction, the prevailing classification must remain our guide.

*Read before the Section on Gynecology and Obstetrics, N. Y. Academy of Medicine, December 18, 1934.

OVARIAN HYPERFUNCTION

CASE 1.—(Beth Israel Hospital) Pathol. No. 20406 L. V., aged fifteen, came under my observation on Dec. 28, 1931, complaining of almost continuous bleeding for the past eight months.

Menses began at thirteen, irregular, occurring every seven to eight weeks, profuse in amount, and lasting from five to six days. The last period set in eight months ago, and has not ceased as yet.

During this period of metrorrhagia she was treated with endocrine preparations, oxytocics, and in June, 1931, was curetted; all without avail.

Physical Examination.—A normally developed girl. No external evidences of endocrine disorder. Her secondary sex characteristics were feminine, complexion light, skin soft and smooth. No hirsuties. Rectopelvic examination disclosed a right ovarian cyst, the size of a hen's egg. Uterus retroverted. Left adnexa not palpable.

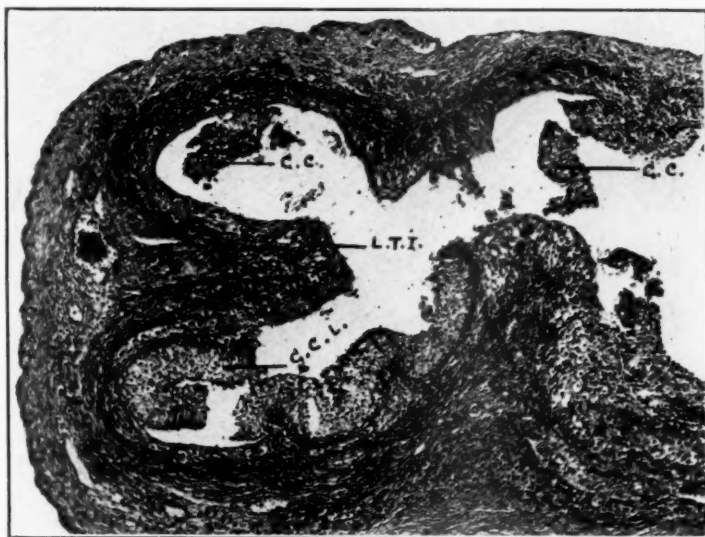


Fig. 1.—(Pathol. No. 20,406.) A persistent follicle cyst, often mistaken for a persistent corpus luteum cyst. Note the luteinization of the theca interna (L.T.I.), nonluteinized granulosa (G.C.), and a pseudoluteinization of granulosa (G.C.I.). ($\times 200$)

Operation.—On Jan. 5, 1932, curettage (for the second time). Because of the persistence of the bleeding I performed a laparotomy on Jan. 8, 1932, resected the cyst from the right ovary, removed the appendix, and corrected the uterine retroversion by a Baldy-Webster shortening of the round ligaments.

Pathologic Findings.—A glandular hyperplasia of the endometrium, with hyaline areas and leucocytic infiltration in the stroma. The ovarian stroma was edematous in parts, and contained many primordial follicles. The walls of the resected cyst were folded, and lined with a thick layer of luteinized theca interna, which in turn was covered with many layers of granulosa cells (Fig. 1). In some areas the granulosa cells had a luteinoid appearance.

Postoperative Clinical Course.—On the day following the resection of the persistent follicle cyst the uterine bleeding ceased. The first postoperative menstruation occurred two months later. Since March, 1932, up to the present she is free from metrorrhagia, and the menses occur every four to six weeks in normal amounts.

CASE 2.—Pathol. No. 21076 (Beth Israel Hospital). E. S., aged twenty-three, consulted me on May 10, 1932, because of persistent uterine bleeding for the past seven months, in varying amounts.

Menses began at fourteen: irregular, every five to six to seven weeks; painless, profuse, lasting about eight days. Her last normal period occurred before her last conception, twenty-one months ago. She was married two years; had given birth to a full-term normal child one year ago.

Present Illness.—Seven months ago she consulted a physician because of the persisting amenorrhea since her confinement, although she did not nurse her child. She received on three successive days, three hypodermic injections of anterior pituitary hormone, and began to bleed after the third injection. The bleeding continued irregularly for about thirteen days. The pituitary injections were resumed and in addition thyroid extract was given orally, for a period of three weeks. Five days after the cessation of this treatment the uterine bleeding returned and has continued



Fig. 2.—(Pathol. No. 21,076) Many atretic follicles (A.F.) in various stages of regression; some as hyalinized pinkish bodies of irregular shapes and dimensions, others with the central cavity not yet completely obliterated, in which some granulosa cells are still discernible. ($\times 120$)

almost uninterruptedly for the past six months. On March 29, 1932, she was curetted because of the persisting metrorrhagia, without avail.

Examination.—A well-developed female of light complexion weighing 224 pounds; has gained 70 pounds since her confinement. Primary and secondary sex characteristics normal. Basal metabolism normal. Blood: R.B.C. 3,980,000; leucocytes 34; monocytes 6; blood platelets 247,740; bleeding time three minutes; coagulation time 4.5 minutes. Vaginoabdominal examination: a slightly enlarged uterus with a patent external os, and moderate uterine bleeding; ovaries could not be palpated on account of a thick abdominal wall. Two x-rays of the skull at different times showed a normal sella turcica.

Treatment.—Having no pathologic report of the curettings obtained six weeks previously, and since the curettage as well as the different endocrine preparations and oxytocic drugs employed failed to stop the uterine bleeding, I advised another diagnostic curettage.

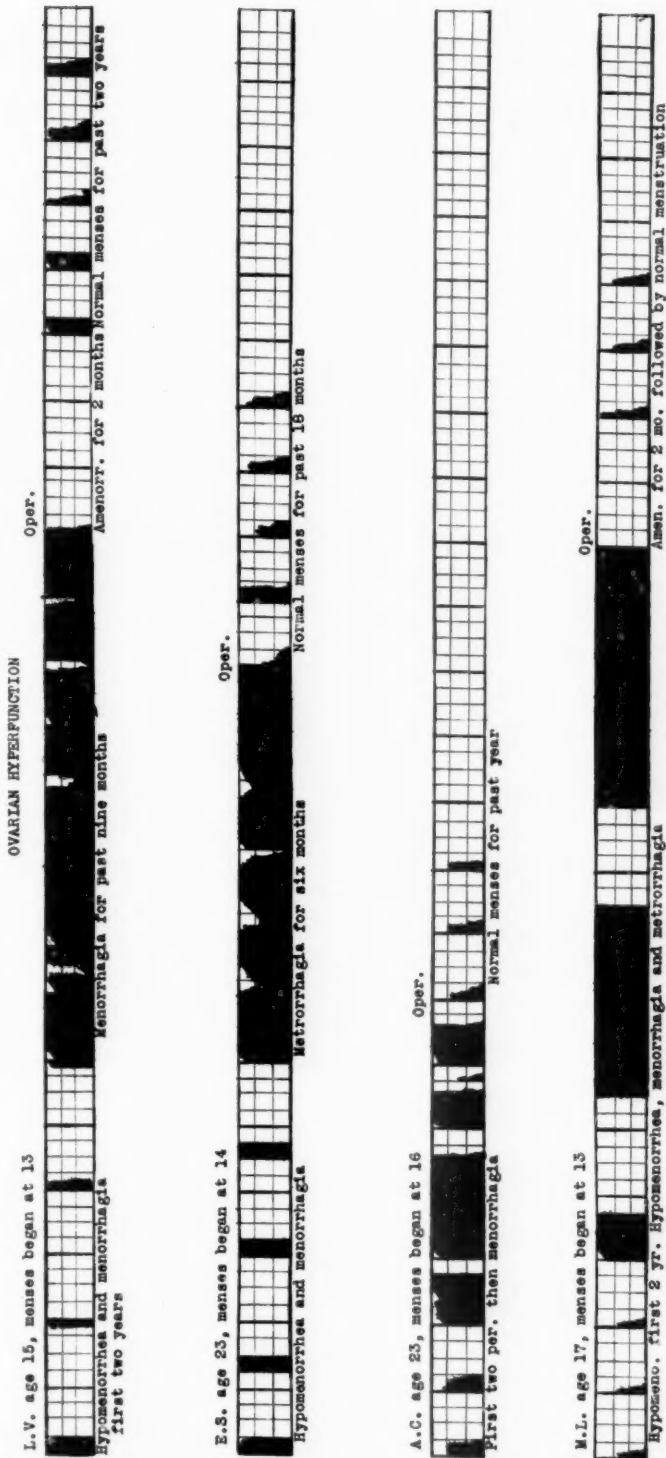


Chart 1.

On May 17, 1932, I performed the second curettage. Uterus measured 9.5 cm. in depth, external os patent, and uterine cavity irregular. An excessive amount of endometrium was recovered. Pathologic report of the curettings: glandular hyperplasia.

As the second curettage also failed to stop the uterine bleeding, and as the cervix remained patent, I suspected in addition to the endocrine dysfunction, also the possibility of a submucous myoma or a polyp, and proposed a more radical procedure.

Operation.—On June 2, 1932, laparotomy, a moderately enlarged uterus, soft and regular in outline. Each ovary enlarged to more than twice the normal size, glistening, tense, not adherent, and studded with many microcysts. No gross evidence of a recent corpus luteum. The fallopian tubes normal. An anterior hysterotomy failed to disclose the presence of either a submucous myoma or a polyp. About two-thirds of each ovary was resected in a wedge-shaped form, and the gap closed with a running Cushing-Lembert suture; followed by an appendectomy.

Pathologic Findings.—Glandular hyperplasia of the endometrium without a secretory phase. The ovarian tissue was moderately edematous and contained an unusually



Fig. 3.—(Pathol. No. 21,076.) Persistent follicle cyst, marked luteinization of the theca interna (T.I.), granulosa cells (G.C.) not affected. ($\times 280$)

large number of atretic follicles in various stages and forms of degeneration (Fig. 2). The cystic follicles were lined with superimposed layers of granulosa cells (Fig. 3) resting upon a luteinized theca interna. One corpus luteum in the stage of proliferation and beginning degeneration was found.

Postoperative clinical course: Since the operation she menstruated normally up to Jan. 9, 1934 (nineteen months).

On March 12, 1934, an intrauterine pregnancy of two months was diagnosed.

On August 1, 1934, she was delivered of a premature stillbirth, breech presentation. On September 14, menses returned and have continued regularly since then.

CASE 3.—Pathol. No. 1103. A. C., aged twenty-three, was admitted to Beth Moses Hospital on Jan. 20, 1933, complaining of menorrhagia, backache, and weakness.

Menses began at sixteen, and after having had two normal menstruations, menorrhagia developed, and since then she flows excessively each month for about twenty days. Any psychic disturbance brings on a uterine flow which lasts for several hours.

Physical Examination.—Marked pallor of skin and mucous membranes. Facial and somatic hirsuties, otherwise the secondary sex characteristics are normal. Vagino-pelvic examination; parous vaginal outlet; cervix short, uterus slightly undersized and anteverted. Left adnexa normal to palpation; right ovary enlarged to the size of a small egg, hard in consistency, tender to touch and prolapsed. Hemoglobin 44 per cent; R.B.C. 3,750,000.

Treatment.—She was curetted for the menorrhagia in 1925, and again in August, 1932. She also received various medications without avail.

Operation.—On Jan. 23, 1933, I performed a total right and a partial left oophorectomy.

Pathologic Findings.—A microcystic degeneration of the ovary, some of the cysts measured 8 mm. in diameter. Many old and recent corpora atretica of different sizes appeared as lobulated or strandlike masses of dark or pale pinkish hyaline

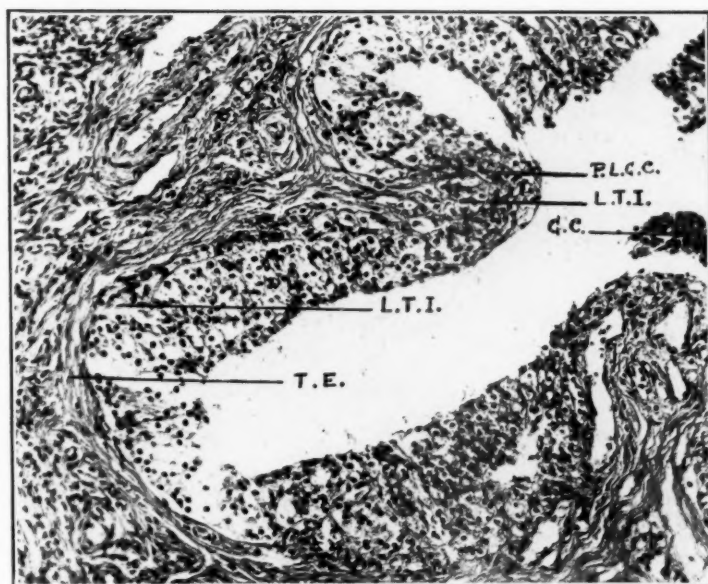


Fig. 4.—(Pathol. No. 1,903) Persistent follicle cyst. Theca externa (T.E.); luteinized theca interna (L.T.I.); nonluteinized granulosa cells (G.C.); pseudoluteinized granulosa cells (P.L.G.C.). ($\times 240$)

material. The most recent ones showed young connective tissue in the center. The follicle cysts showed smooth walls; lined with three to four rows of granulosa cells and in many, cumuli were present with or without degenerated ovules. The stroma was normal, and contained too few primordial follicles for her age.

Postoperative Clinical Course.—Since the operation, now over one year, her menses are regular, five to six days' duration, and normal in amount. In May, 1934, she was gravid in the fifth month.

CASE 4.—Pathol. No. 1903. M. L., aged seventeen, admitted to Beth Moses Hospital on Aug. 8, 1933, complaining of continuous uterine bleeding for the past four months.

Menses began at $13 \times 28 \times 3$, and continued in this manner for two years. Since her fifteenth year she menstruated at irregular intervals and flowed from three to twelve weeks at a time. For the past four months unremitting uterine bleeding.

Physical Examination.—An overdeveloped girl but not disproportionately; primary and secondary sex characteristics normal. Rectopelvic examination disclosed a left cystic ovary somewhat larger than a pigeon's egg. The rest of the generative organs seemed to be normal. Hemoglobin, 50 per cent; R.B.C., 3,260,000; W.B.C., 6,000; no abnormal cells; urine negative.

Treatment.—For twelve days intramuscular injections of 1 c.c. of antuitrin-S and 15 gr. of calcium lactate three times daily. In spite of the treatment the bleeding grew worse; the hemoglobin fell to 40 per cent; and the red blood cells to 2,800,000. I then decided to operate.

Operation.—The operation, which was preceded by a blood transfusion of 250 c.c., consisted of a curettage, a resection of the cyst-bearing portion of the ovary and an appendectomy. The right ovary although of normal size did not show any evidence of recent ovulation.

Pathologic Findings.—Endometrial hyperplasia and cystic dilatation of some glands. No signs of secretory activity. In the stroma a considerable degree of

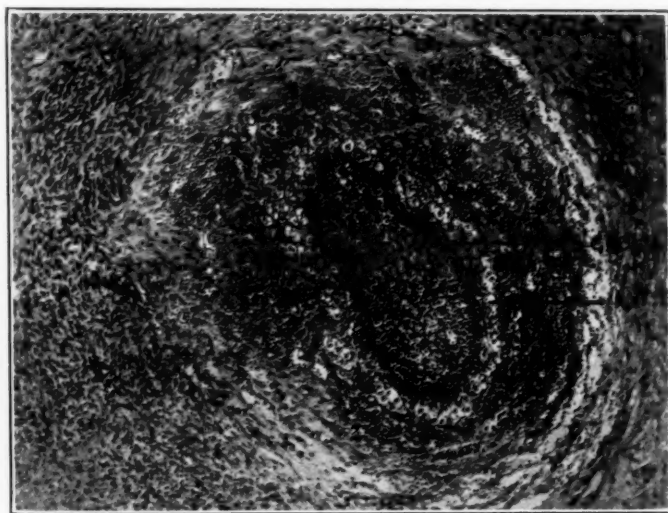


Fig. 5.—(Pathol. No. 1,903.) Atretic follicle, granulosa cells retaining a normal morphology (G.C.); luteinization of the theca interna (L.T.I.). ($\times 170$)

blood extravasation, and a mononuclear lymphocytic infiltration. The resected ovarian cyst (Fig. 4) showed plications of its walls and marked luteinization of the theca interna, covered with a thick layer of nonluteinized granulosa cells. The luteinization of the theca interna was also noted in the smaller follicle cysts and in many atretic follicles (Fig. 5) in which the granulosa retains its normal morphology.

Postoperative Clinical Course.—Immediately following the operation the uterine bleeding ceased, followed by an amenorrhea for seven weeks. Subsequently the menstrual periods became four weekly in type, normal in amount, and have continued in this fashion since then.

OVARIAN HYPOFUNCTION

CASE 5.—Pathol. No. 22364 (Beth Israel Hospital). H. M., aged twenty-nine, married two years; nullipara and nulligravida, consulted me on March 8, 1933, complaining of sterility and irregular menstruation.

After her first menstrual period which occurred at the age of sixteen, there followed a period of amenorrhea for two years. Since her eighteenth year the

menstrual intervals have varied from one to three weeks, and the flow from fourteen to twenty days. Ten years ago she was curetted because of menorrhagia. For three months following the curettage, the menses were normal, after which the menorrhagia and the polymenorrhea returned. For the past three years the intermenstrual intervals were prolonged from three to twelve months. The last menstrual period occurred five months ago.

Physical Examination.—With the exception of a moderate degree of facial but more marked somatic hirsuties, her other primary and secondary sex characteristics were normal. Both ovaries were enlarged, the left to the size of a chicken's egg, and the right somewhat smaller. The fallopian tubes, apparently normal.

Operation.—On March 14, 1933, I performed a curettage and a resection of about two-thirds of each ovary.

Pathologic Findings.—Glandular hyperplasia of endometrium (Fig. 6); the lining epithelium was columnar and most of the cells filled with mucus, resembling the interval or the beginning menstrual phase. A marked lymphocytic infiltration of

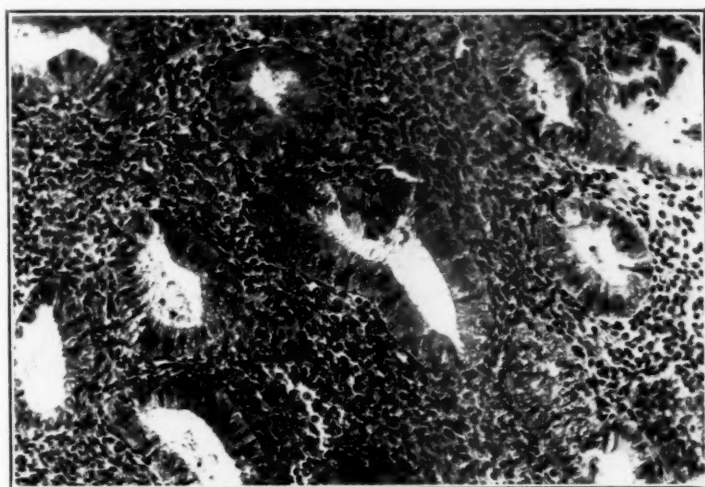


Fig. 6.—(Pathol. No. 22,364.) Endometrium, secretory phase, columnar epithelium and gland lumina filled with mucus, lymphocytic infiltration of stroma. ($\times 260$)

the stroma. The ovarian stroma was normal, contained many primary, secondary, and tertiary follicles. No corpora lutea, and only a slight luteinization of the theca interna.

Postoperative Clinical Course.—Within one week after the operation the menstrual period had set in, and the flow lasted but three days, instead of the usual three weeks. Since then, now over one year, the sex cycles are normal. On March 4, 1934, she was gravid in the fourth month.

CASE 6.—Pathol. No. 22997 (Beth Israel Hospital). F. R., aged thirty-two, consulted me on July 18, 1933, because of an amenorrhea of one year's duration, intermittent cramplike pains in the lower abdomen for the past few days, and slight vaginal staining.

Menses began at thirteen, always irregular; occurring every two to three months, lasting six to seven days, profuse in amount. For the past three years the menstrual flow was more moderate. The last period had occurred one year previously.

Married twelve years, had given birth to two normal children, the last one seven years ago. She miscarried once, ten years previously.

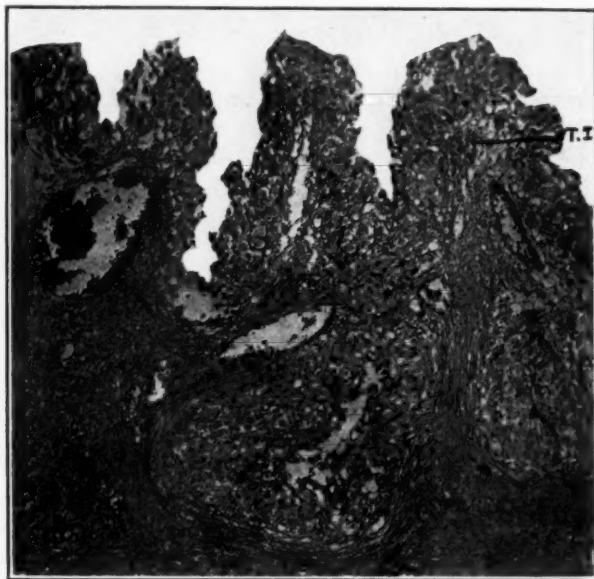


Fig. 7.—(Pathol. No. 22,997.) Persistent corpus luteum cyst, no luteinization of theca interna (T.I.). ($\times 180$)

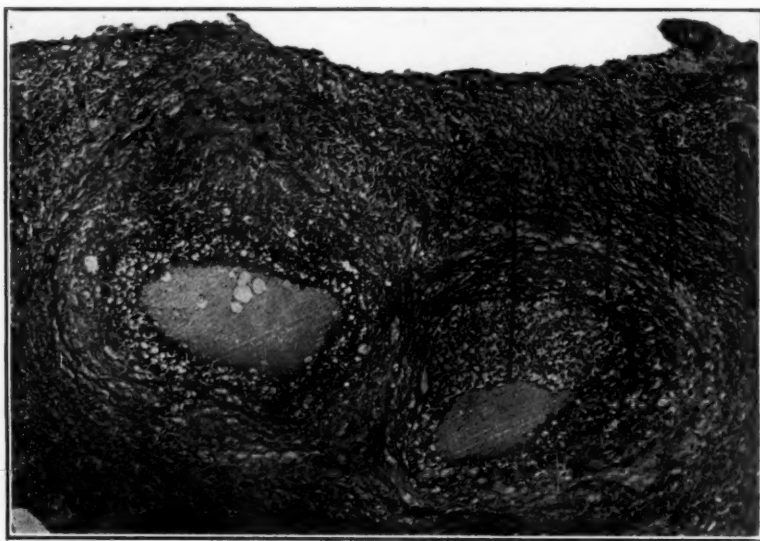
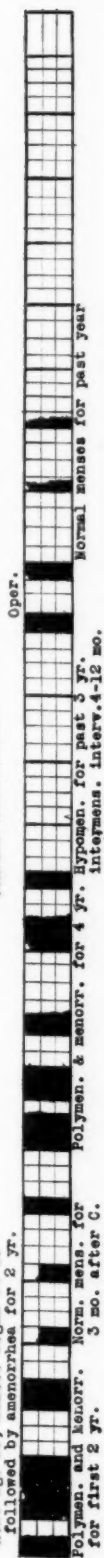


Fig. 8.—(Pathol. No. 22,997.) Secondary follicles undergoing atresia with pronounced luteinization of the granulosa (L.G.); slight luteinization of theca interna (L.T.I.); theca externa (T.E.). ($\times 160$)

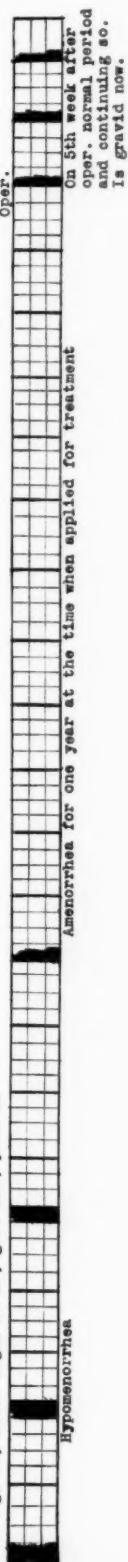
Physical Examination.—A healthy-looking, normally developed female. Vaginal outlet slightly relaxed, uterus normal in size and position. Right ovary enlarged to the size of a small egg, tense, and cystic. The other generative organs apparently normal.

OVARIAN HYPOFUNCTION

H.M. age 29, menses began at 16 followed by amenorrhea for 2 yr.



P.R. age 32, menses began at 13, Grav 411, para 11



A.B. age 25, menses began at 13. Sterile



Chart 2.

Operation.—On July 9, 1933, I performed a curettage and a resection of about two-thirds of each ovary.

Pathologic Findings.—Endometrium in a resting state. Ovarian stroma normal; normal proportion of primordial follicles in various stages of degeneration. A persistent corpus luteum cyst (Fig. 7). The follicle cysts were lined with but few rows of granulosa, and very slight luteinization of the theca interna. In some of the secondary follicles the luteinization of the granulosa was quite advanced (Fig. 8).

Postoperative Clinical Course.—On Aug. 11, 1933, examination showed normal sized ovaries, freely movable uterus, the amenorrhea still persisting. One hundred R.U. of prolan were administered intramuscularly for six days. Six days later menstruation set in and lasted for five days. On September 26, one intramuscular injection of 100 M.U. of folliculin was administered and on the following day the second menstrual cycle had occurred; it lasted six days. Since then the menses have been normal. On January 8, 1934, she was gravid in the second month.

CASE 7.—Pathol. No. 23,287 (Beth Israel Hospital). A. B., aged twenty-five, married three and a half years, consulted me on Sept. 11, 1933, because of sterility.

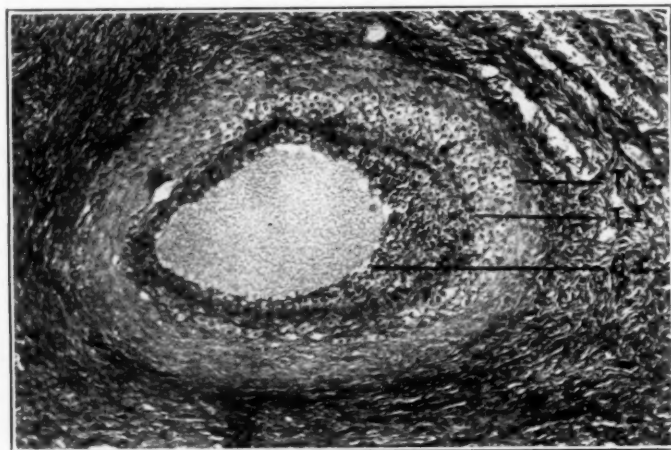


Fig. 9.—(Pathol. No. 23,287.) Secondary follicle undergoing atresia. Theca externa (T.E.); theca interna (T.I.) with marked luteinization; beginning luteinization of the granulosa cells (G.C.). ($\times 160$)

Menses began at thirteen, irregular in type, occurring every two, three to five months; six to seven days' duration, profuse in amount and painless. The last menstrual period occurred on Aug. 28, 1933.

Physical Examination.—A pronounced somatic and less marked facial hirsuties. Vaginal outlet nulliparous; cervix and uterus were normal. Ovaries enlarged to about two and a half times the normal size, not tender and not adherent. The symphysis pubis was wide and thick, masculine in form.

Operation.—On Sept. 23, 1933, I performed a bilateral partial oophorectomy and an appendectomy.

Pathologic Findings.—A normal ovarian stroma harboring a quantity of primordial follicles, corresponding to the age of the patient; many of them were degenerated. Also a considerable number of atretic follicles in different stages of involution. The follicle cysts form the prominent pathologic lesion; they were lined with one to three rows of granulosa cells, and their theca interna showed definite luteinization. The lutein conversion of the theca was also noted in the

secondary atretic follicles (Fig. 9), and in some of them the granulosa also showed slight luteinic metaplasia. Only one tertiary follicle was found.

Postoperative Clinical Course.—Three days after the operation a menstrual period set in, and the flow lasted four days. This was the first time since puberty that she had had a menstrual interval of only four weeks' duration. For the past six months her menstrual cycles have repeated themselves, every four weeks.

Although I have grouped these cases into two main classifications, a closer study reveals that they can be subdivided into more accurate and more specific groups. It is essential to distinguish between ovarian dysfunctions in which a sex cycle is still preserved, even though imperfect, and those in which it has disappeared. To attain this diagnostic end we must use the normal sex cycle as the standard of comparison for all ovarian dysfunctions.

The biomechanism of a normal sex cycle consists of two phases, a pre- and a postovulatory phase, which occur in rhythmic sequence, each characterized by its hormonal and structural characteristics and clinical manifestations. Comparing ovarian dysfunctions with this physiologic standard, we find that they may be grouped into the following classifications:

1. *Functional Metrorrhagia.*—An arrhythmic dysfunction, characterized by almost continuous uterine bleeding. The chief pathologic changes found were: (a) persistent granulosa cell cysts; (b) extreme luteinization of the theca interna; (c) atretic follicles, in unusually large numbers; (d) small follicle cyst lined with many layers of granulosa; and (e) endometrial hyperplasia. These morphologic findings indicate an uninterrupted overactivity of the first phase of the sex cycle, and an inhibition of the second.

2. *Functional Amenorrhea.*—An arrhythmic dysfunction, characterized by a continued absence of menstruation. In contrast to the sufferers from metrorrhagia these patients feel well and consult us only because they either consider themselves sexually inferior before marriage, or because of sterility or suspected pregnancy thereafter. It is also interesting to note that although this type of amenorrhea may have persisted for a year or more, it is not associated with the vasomotor disturbances characteristic of the natural or the artificial menopause. The main pathologic changes found were: (a) a persistent corpus luteum cyst; (b) a paucity of granulosa cells in the cystic follicles; (c) no, or only slight luteinization of the theca interna; (d) marked luteinization of the granulosa in secondary follicles; and (e) no endometrial hyperplasia. In this type of case the second phase of the sex cycle predominates persistently, and to such an extent that the granulosa is undergoing luteinization before ovulation has taken place.

Both these ovarian dysfunctions, metrorrhagia and total amenorrhea, present an harmonious correlation between their morphology and symptomatology. The reasons for this harmony are quite evident. Just as the pathology in each of them consists of fixed morphologic end-results

of long-standing dysfunctions, so is the resulting symptomatology uniform in nature; acyclical continuous bleeding in the former, and acyclical amenorrhea in the latter.

In between these clear-cut and well-defined types of ovarian dysfunction, we meet with a variety of disorders in which although both phases of the sex cycle are manifest, the functional result is pathologic because the physiologic sequence of the cycles has been disturbed by an untimely occurrence. These types are: functional menorrhagia, polymenorrhea, hypomenorrhea, and oligomenorrhea.

3. *Functional Menorrhagia and Polymenorrhea.*—Both these ovarian dysfunctions are accompanied by a preovulation and a postovulation phase, with the former in the ascendency. The dominance of the first phase is evidenced by the many incompleting ovulations in the form of excessive follicular ripenings, giving rise to an endometrial hyperplasia and hyperemia with excessive menstrual bleeding. We also note premature retrogressions of the ovulating process, in the form of numerous atretic follicles, causing an increase in the number of cycles at the expense of shortened intermenstrual periods.

4. *Functional Hypomenorrhea and Oligomenorrhea.*—In these types of ovarian dysfunction we also note a disturbed rhythm of the sex cycles, with the postovulation phase predominating. The rate of follicle maturation is greatly reduced. The luteinizing effects are quite prominent, as shown by the luteinization of the granulosa cells even before the follicles have ruptured, namely in the secondary stage. In harmony with the morphologic process are the functional results, prolonged intermenstrual intervals, hypomenorrhea; or too little bleeding at the time of menstruation, oligomenorrhea.

The striking difference between menorrhagia, polymenorrhea, hypomenorrhea and oligomenorrhea on the one hand, and metrorrhagia and amenorrhea on the other, is that in the former types of dysfunction, both phases of the cycle are still struggling to regain a balance, while in the latter this struggle is over and only one of the phases rules to the almost complete exclusion of the other. The detection and recognition of this difference is of paramount clinical importance. *I maintain that as long as an ovarian dysfunction still manifests a rhythmical character, broken and distorted as it may be, it is incumbent upon us to persist in opotherapeutic or other nonsurgical methods of treatment; but as soon as the dysfunction becomes devoid of any rhythmic semblance, it indicates that the initial undetectable structural changes within the ovary became definite and fixed lesions, and that the disease has passed from the functional into the organic state, for which partial oophorectomy is thus far the most efficacious remedy.*

The diagrammatic illustration of the beneficial clinical results of partial oophorectomy in ovarian dysfunctions shown in Charts 1 and 2 is so convincing that additional elaboration is unnecessary.

The biochemical investigations of the blood and the urine in cases of ovarian dysfunction by R. T. Frank,¹ and of the hormone content in ovarian tumors by Philipp² harmonize with my clinical and pathologic findings, and lend further validity to the axiom that "*all functional disorders have an organic basis.*"

The Luteinization of the Theca Interna.—In 1931, Noguchi³ described this pathologic entity for the first time in hypophysectomized rats injected with pregnancy urine. Seley, Collip and Thompson⁴ found a luteinization of the theca interna in sexually immature hypophysectomized rats, when injected with pituitary-like hormone, while the granulosa remained unaltered. In later experiments Collip, Seley, Anderson, and Thompson⁵ found that young suckling pigs also responded in a similar manner to injections with pituitary-like hormone.

These investigators claim that the theca interna luteinization observed in the experimental animals is due to the lack of a "complementary substance," which only the pituitary of a normal full-grown animal can produce, and which is not contained in the pituitary-like hormone used in the experiments.

Geist⁶ described for the first time (as far as my investigation showed) the luteinization of the theca interna in human beings both after injections with large doses of antuitrin-S, and in four out of twenty-five controls.

I found theca interna luteinization only in ovaries harboring persistent follicle cyst, of much larger dimensions than the ordinary microcystic follicle, with clinical manifestations of ovarian hyperfunction expressing itself in the form of meno- or metrorrhagia of varying rhythm and intensity.

The causal relationship between persistent follicle cysts and increased uterine bleeding of an acyclical form was intimated by August Mayer⁷ in 1926. He reasoned thus: "If a persistent corpus luteum cyst leads to an actual amenorrhea, then the opposite ought to result from a persistent follicle cyst." Schroeder,⁸ Kermauner,⁹ Tietze,¹⁰ and others have proved that this assumption is an actual fact. One of the hiatuses left by the contributors to this subject is the oversight of the morphologic changes in the theca interna. With the exception of Geist, I failed to find a single reference to this structural phenomenon in the human being. I am led to believe from a careful perusal of the literature that persistent follicle cysts with marked luteinization of the theca interna have been mistaken by many for a persistent corpus luteum cyst. As an illustration of this contention I shall cite Tietze very briefly. One of his cases of ovarian hyperfunction with excessive uterine bleeding was curetted. The pathologic report was endometrial hyperplasia. Three weeks later an oophorectomy was performed and the findings were recorded as a persistent corpus luteum cyst. To explain this contradictory pathology the author proffered an ingenious but highly fantastic hypothesis: "Originally we were dealing with a case of large persistent

follicle cyst which became luteinized subsequent to the curettage." I am convinced that Tietze has mistaken the persistent follicle cyst with its luteinized theca interna for a persistent corpus luteum cyst.

To avoid the recurrence of this error I present a composite micrograph (Fig. 10) of a persistent corpus luteum cyst; of a corpus luteum in flower; and of a persistent follicle cyst with a luteinized theca interna. A comparative study of these structures illustrates definitely their morphologic differences.

What are causal and morphologic correlations between the theca interna luteinization in immature or hypophysectomized rodents injected with pituitary-like hormone; in human beings treated with antuitrin-S;

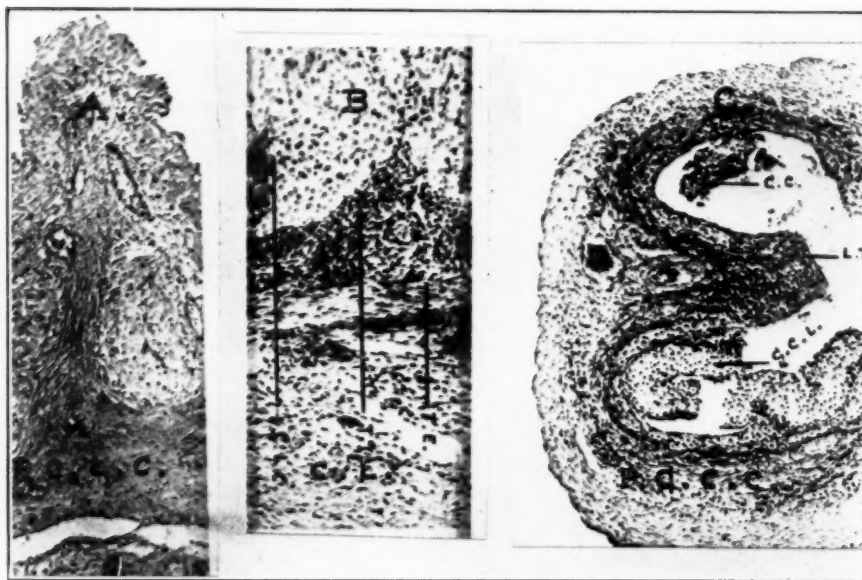


Fig. 10.—A composite photomicrograph of a persistent corpus luteum cyst at A; a normal corpus luteum in flower at B; and a persistent follicle cyst at C. Note the theca interna in the corpus luteum in flower: it consists of round dark staining epithelial cells, resembling the granulosa, cells; in the persistent corpus luteum cyst the theca interna is hardly discernible, while in the persistent follicle cyst the theca interna is extremely luteinized.

and in human beings suffering from ovarian dysfunctions, particularly of the hyperfunctioning type? According to Collip and his coworkers, this peculiar response of the ovary is due to the lack of a specific pituitary complement, which he succeeded in isolating. Geist produced a theca interna luteinization in human ovaries with large injections of a pituitary-like hormone. Engle¹¹ showed definitely that there is a marked difference between pituitary-like substances and the hormone derived from the anterior lobe of the hypophysis. Geist's results must hence be due to the fact that the substance he used lacked that pituitary complement which stands for a normal activation of the ovary. The

spontaneous generation of theca interna luteinization in my cases of ovarian dysfunction must therefore also be due to the same cause, namely an abnormal prolactin secretion.

How does partial oophorectomy restore the pituitary-ovarian balance? A comprehensive answer to this question would require a review of the principles governing interglandular correlations in general. Limitation of space in this contribution precludes even the slightest reference to this fascinating problem. It is necessary, however, for our immediate purpose to know at least the essentials of pituitary-ovarian correlations; for without this knowledge no therapeutic measure employed for the correction of an ovarian dysfunction can be undertaken intelligently.

It is now an accepted fact that the pituitary stimulates the ovary, and that the sex gland inhibits the anterior lobe of the hypophysis. As long as these reciprocal stimulations and inhibitions occur in timely and proportionate fashion, so long will the sex cycles run a physiologic course. The moment, however, the balance between the follicle-ripening and the luteinizing hormones of the anterior hypophysis is upset, abnormal structural responses take place in the ovary and in the endometrium, leading to abnormal cyclical or acyclical sex cycles termed ovarian dysfunctions.

In ovarian hyperfunctions the morphologic changes in the sex gland and in the endometrium, as already described in detail, represent the effects of a pituitary hyperstimulation with follicle-ripening hormone. The character and degree of the morphologic responses varies with the phase of the dysfunction. During the early stages when the forces regulating the sex cycles are still attempting to regain their balance, neither the morphologic changes in the ovary, nor the clinical manifestations of the dysfunctions are characterized by uniformity; but later on, when the dysfunction has existed for a long time, both the morphopathology and the symptomatology become fixed and unvarying. It is also to be noted that the more accentuated the follicle-stimulating process is, the more suppressed becomes the luteinizing property of the pituitary; and the more pronounced the granulosa hyperplasia as a result of this type of stimulation, the greater is the ovarian inhibition upon the already weakened luteinizing forces of the hypophysis. A surgical removal of a sufficient amount of ovarian parenchyma harboring an excess of morphologic and biologic elements responsible for the existing functional disturbance, permits the pituitary to regain its intraglandular balance, and thus a restoration of a normal pituitary-ovarian correlation.

In ovarian hypofunctions the reverse holds good. Here the luteinizing forces of the anterior hypophysis play the leading rôle. The morphologic responses to this stimulation are reflected in the ovary and the endometrium. The degree of the structural changes in the ovary and the clinical manifestations of the dysfunction depend upon the

phase of its development. The nearer we approach the terminal phases of the dysfunction the closer does this correlation become, as shown above. The inhibitory effect of the ovary in this type of dysfunction is upon the already weakened follicle-ripening properties of the hypophysis. A removal of a sufficient amount of ovarian parenchyma containing these disturbing elements helps in the restoration of a normal intrahypophyseal balance, and thus a return to a normal pituitary-ovarian correlation.

Since no endocrine function is strictly uniglandular, and since every function of the ductless glands is regulated and controlled by the vegetative nervous system, which is itself activated by the hormones of the endocrines, this study would be incomplete without a very brief allusion to the thyroid and the adrenals, which next to the pituitary, stand in closest functional relationship to the ovary, and to the effect of sympathetic and parasympathetic innervations upon the generative organs.

The Thyroovarian and the Adrenoovarian Correlations.—In Breitmänn's¹² scheme of interglandular correlations, which is followed in this study, the thyroid and the adrenals are classified as the stimulators of the ovary, and the ovary as their inhibitor. From clinical observations, experimental studies, and hypotheses bearing on this problem we gather the following information. Thyroxine stimulates the parasympathetic (or vagus), and adrenalin the sympathetic. The parasympathetic fibers (the nervi irrigenti) are the sensory and the vasodilators of the internal and external organs of generation, while the sympathetic (the hypogastrics) are the motor and vasoconstrictor fibers.

Oliver and Schafer¹³ have shown (1895) that intravenous injections of thyroid extract caused a fall in blood pressure. The physiologic states in which a drop in blood pressure occurs are the premenstrual and the early gravidity periods which must be due to an increased vagotonia called forth by an increased thyroid activation. Lange¹⁴ observed that women suffering from pregnancy toxemia fail to show the physiologic enlargement of thyroid, and that pregnant animals require more thyroid than nonpregnant in order to remain in a normal state.

Van der Hoeven,^{15, 16, 17} as a result of studies of the treatment of pregnancy toxemia and ovarian dysfunctions with thyroid and adrenal extracts, ventured the hypotheses that thyroxine enhances prolactin B elaboration, and adrenalin that of prolactin A. From the experimental researches of Kraul, Hirsch-Hoffman and others (quoted by van der Hoeven), we learn that sympathetic stimulation promotes luteinization, and inhibits follicle maturation; while vagus stimulation hastens follicle ripening, and inhibits luteinization.

I shall now attempt to synthesize all these experimental clinical and hypothetical statements concerning the physiology of the hypophysis, the thyroid, the adrenals, and the vegetative nervous system into an harmonious correlation to ovarian dysfunctions. Before proceeding with this attempt I wish to modify the statement of van der Hoeven "that the thyroid enhances prolactin B secretion, and adrenalin prolactin A" to read "the thyroid inhibits prolactin B elaboration, and the adrenal that of prolactin A." From an endocrinologic standpoint this modification does not

vitiates van der Hoeven's theoretical or therapeutic concepts; but it does sustain the physiologic axiom of interglandular correlations, that no endocrine can return the impulse received to its original source in the same manner. Both the thyroid and the adrenals are stimulated by the hypophysis; they cannot therefore return this stimulating impulse to the hypophysis. The only way in which the thyroid and adrenals can influence the pituitary is in an inhibitory fashion.

In ovarian hyperfunction the follicular apparatus is hyperstimulated by an increase of prolactin secretion. This heightened pituitary function stimulates the thyroid which leads to an accentuation of vagus innervation. The inhibition of prolactin B by the increase in thyroxine output, and the furthering of prolactin A secretion by the increased vagotonia, represent an harmonious combination of forces and impulses furthering an ovarian dysfunction in which the first phase of the sex cycle predominates. No mention is made of the rôle played by the adrenal because the overwhelming pituitary and thyroid influences suppress to a very large extent its inhibitory effect upon prolactin A production. The statement concerning a greatly diminished adrenal function in this type of ovarian dysfunction is proved clinically by the much reduced sympathicotonia, noted in these patients.

In ovarian hypofunctions the luteinization process in the ovary is markedly pronounced, as a result of an increased prolactin B activation. These cases present abundant clinical evidences of sympathicotonia, which must be due to an increased adrenal function. Increased sympathetic stimulation enhances the process of luteinization, and the increased adrenalemia by further inhibiting the prolactin A productions contributes to the prolongation of this form of dysfunction. And just as in the hyperfunctions the thyroid plays the leading supportive rôle, so does the adrenal usurp this rôle in the ovarian hypofunctions. A close clinical observation of patients suffering from ovarian hypofunction furnishes abundant evidences of sympathicotonia.

SUMMARY AND CONCLUSIONS

1. Seven cases of ovarian dysfunction were studied clinically and pathologically with the object in view of ascertaining whether functional diseases have an organic basis or not.

2. It was shown that structure and function are indissolubly linked to each other; that the morphologic alterations are almost imperceptible during the early phases of the dysfunction, but that they gain in definiteness and permanence as the dysfunction continues to exist; and that the highest degree of correlation between physiologic and morphologic pathology is noted in the terminal phases of ovarian dysfunctions.

3. An ovarian dysfunction may be considered as having reached the end of its evolution and having merged into a fixed pathologic state when all manifestations of an attempt to return to cyclical functioning have disappeared.

4. As long as cyclical characteristics are still observed in an ovarian dysfunction, we may still pursue nonsurgical therapeutic procedures; but when all palliative measures have been given a fair trial, when all traces of rhythmic functioning have disappeared, and when on bimanual palpation a distinct enlargement of one or both ovaries is established, partial ovarian resection is justified.

5. An adequate analysis and synthesis of the basic endocrinologic principles governing ovarian function and the influence of the vegetative nervous system upon the genital sphere were presented, both of which support the rationality of partial oophorectomy in properly selected cases of ovarian dysfunction.

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In the opinion of the author, conservatism is the keynote to be adopted when surgical removal of the ovaries is being considered for various vague pelvic pains. Taking a clinical approach to the subject, he stresses the necessity of physical signs being elicited in the ovary or its neighborhood before blaming it as a cause of pain.

Ovaries which are the seat of chronic infection are usually best treated by clearing up the pelvis, returning the organs to as normal a position as possible and removing what is beyond repair. Prolapsed ovaries, with or without associated retroflexed uteri, are mentioned as causes of pelvic pain. The treatment of this condition is restoration of the organs to as normal a position as possible.

Endometriomas, often with ovarian dysmenorrhea, may cause pain, especially in women over thirty. The author professes little belief in the idea that small cystic ovaries or cirrhotic ovaries are pathologic entities causing pain.

Mention is made of three conditions which have been wrongfully dubbed ovarian pain: (a) reflected pain, (b) neurasthenic pain, and (c) hysterical pain.

In conclusion, the author advises careful examination for definite physical signs of pathology in the genitalia, if necessary under an anesthetic when a Rubin's test may also be carried out, and if no pathologic condition can be found, the patient should be dissuaded from operation and put on general medical management.

F. L. ADAIR AND I. C. UDESKY.

THE MANAGEMENT OF THE PRENATAL AND THE POSTNATAL CERVIX

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THE purpose of this presentation is to discuss the problems of cervical disease as they are met in obstetric practice, and to define the responsibilities of the obstetrician who has to deal with them. The substance of the paper is based upon observations which have been conducted in the department of obstetrics of the Jefferson Medical College Hospital during a nine-year period. Contributions that have been made by this clinic to the study of cervical pathology from time to time are incorporated, and the methods of treatment that are now in vogue are described.

(The two types of cervical disease which concern the obstetrician in modern day practice are the inflammatory and the precancerous, or cancer predisposing. Of the two, the inflammatory lesions are a particular consideration of the antenatal period and the cancer predisposing of the postnatal.)

In a publication five years ago, Dr. J. Bernard Bernstine and one of us (Montgomery) discussed the importance of cervical infection in obstetrics and presented the results which were obtained from 1925 to 1928 in a special clinic for the treatment of gonorrhea complicating pregnancy. The results proved quite satisfactory in the lowering of puerperal morbidity and in the lessening of ophthalmia neonatorum. An outstanding feature of the study was the proof that the cervix can be treated without danger to the mother or to the embryo. Abortion, miscarriage, and premature labor occurred no more frequently among the treated patients than in the others of the service. These findings encouraged us to continue with our efforts to treat cervical inflammation of this type and better prepare the birth canal for delivery.

A recent review of our statistics reveals that (from 1928 to 1932 the laboratory diagnosis of gonorrhea (positive smear) was made in 84 of the 3,586 patients who were later delivered) under our supervision. (In no instance among these 84 patients treated for gonorrhea complicating pregnancy did ophthalmia neonatorum occur in the newborn. During the same time there were fifteen cases in the nontreated patients. (In two of the 84 treated patients pregnancy terminated prematurely, once by abortion and once by premature labor.)

We concluded that it is decidedly worth while to treat these patients during the course of pregnancy, that the treatment, while not expected to cure the cervical disease, allays the inflammation and prepares the birth canal for labor and the puerperal period.)

METHOD

The treatment consists of certain measures which are performed by the patient in her home, and others which are conducted in the antenatal clinic. The home care consists of a daily Lugol's solution douche (1 teaspoonful of liquor iodi compositus to 2 quarts of warm boiled water) administered through a carefully prepared douche apparatus. Upon retiring the patient inserts a medicated vaginal suppository consisting of 4 per cent powdered mereurochrome in a cacao butter base. This suppository is allowed to liquefy in the vaginal tract and remain until the next douche is administered. Upon the weekly visit at the clinic the cervix is exposed, cleansed with an alkaline antiseptic, and painted with a 5 per cent watery solution of mereurochrome or a 1:1000 watery solution of metaphen. The solution is carried with a swab well up into the cervical canal. With a second small swab it is instilled in the anterior portion of the urethra. If the granulations of an ulcerated cervix are effusive, they are touched up lightly with the electric cautery.

We have no hesitancy in applying this same treatment to the non-specific infections of the cervix in pregnancy. Any doubt as to the infective nature of these lesions is dispelled by histologic study of the involved tissue. In 20 instances we collected tissue for biopsy from cervixes of this type. Examination of the histologic sections revealed in each instance desquamation of the squamous epithelium, purulent fluid exuding from the cervical glands, and an extensive leucocytic infiltration of the adjacent cervical stroma. The picture is that of an open ulcer (Figs. 1 and 2).

These nonspecific infections of the cervix challenge the watchfulness of the obstetrician and also call for active treatment. In such instances more reliance is to be placed upon the prenatal care than upon the practice of trying to sterilize the birth canal at the time of labor. While not in any way minimizing the importance of careful antiseptic preparation of the birth canal at the time of delivery, it is so obviously impossible to carry medication into the infected lumina of the cervical glands that the practice of repeatedly instilling antiseptics into the vaginal tract during the course of labor and especially of massaging them into the cervix appears not only futile but also not entirely devoid of danger.

The paramount concern of the labor period is careful management and conservation of the defensive forces of the patient. Of particular importance to this end are the following points: first, preservation of the membranes and noninterference in the stage of dilating, a strict policy of "hands off" during the time that nature is gently thinning and dilating the cervix; second, a reasonably prompt delivery of the fetus when the stage of dilatation is completed; third, careful atten-

tion to the placental stage with prompt expulsion of that organ when it has separated from the wall of the uterus, a policy which calls for arrest of anesthesia and postponement of repair until the third stage is completed and the empty uterus firmly retracted; fourth, tampon-

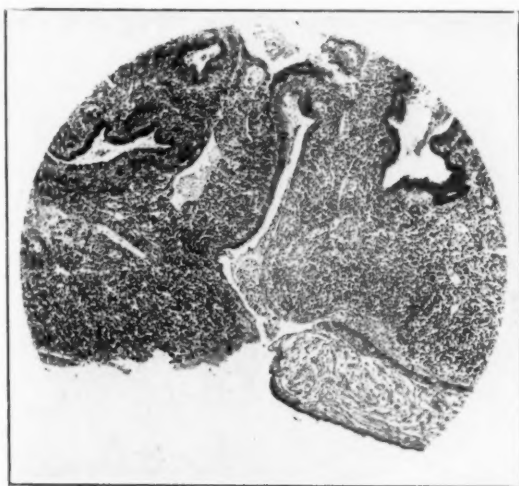


Fig. 1.—Acute ulcerative endocervicitis complicating pregnancy. Note the loss of squamous epithelium, the pus exuding from the cervical gland, the extensive leucocytic exudate in the stroma. (Photomicrograph 60X.)

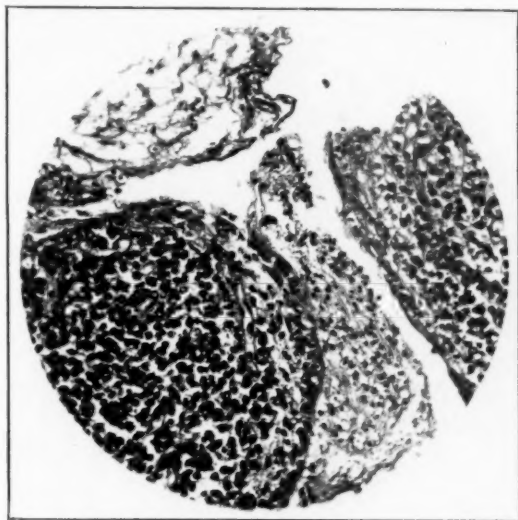


Fig. 2.—Acute ulcerative endocervicitis complicating pregnancy. Higher power magnification taken at the ostium of the cervical gland in Fig. 1. (Photomicrograph 220X.)

age of the uterus whenever that organ fails to contract properly or when moderate bleeding occurs; fifth, avoidance of exposure or manipulation of the cervix after delivery except for the purpose of arresting traumatic hemorrhage.

We have been particularly interested in the effect that premature rupture of the membranes and prolonged labor have upon the convalescence of mother and baby after delivery. The influence of these conditions upon the production of postpartum endometritis and puer-



Fig. 3.—Acute inflammation of the margin of the placenta. Light leucocytic infiltration extending from the membranes to the corresponding layers of the margin of the placenta. (Photomicrograph 57 \times .)

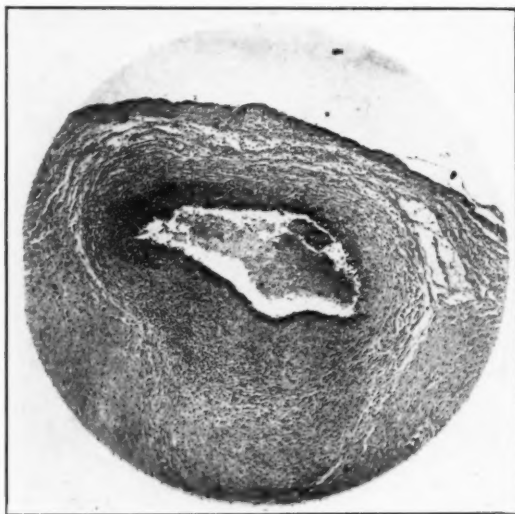


Fig. 4.—Acute inflammation of a large placental vessel. Leucocytic infiltration of the intima, the muscle wall, and the perivascular tissue of one of the large veins on the fetal surface of the placenta. (Photomicrograph 40 \times .)

peral morbidity has been frequently emphasized, but the part they play in creating lesions of the placenta and fetal circulation has not been so well recognized.

Significant contributions in the latter field have been made by Warnekros, Siddall, Slemons, and others. The attention of one of us (Montgomery) was directed to the problem during the course of a histologic study of 650 freshly delivered placentas. In 67 specimens of this group (10 per cent) acute inflammatory lesions were found. The inflammatory reaction apparently develops during the course of labor and is associated particularly with instances of premature rupture of the membranes, prolonged labor, and difficult operations of vaginal delivery. The infection apparently begins in the membranes at the margin of the cervical aperture, ascends to the edge of the placenta (Fig. 3), is taken up by the fetal vessels of the placenta (Fig. 4), gives rise not infrequently to thrombophlebitis of the cord vein (Fig. 5).

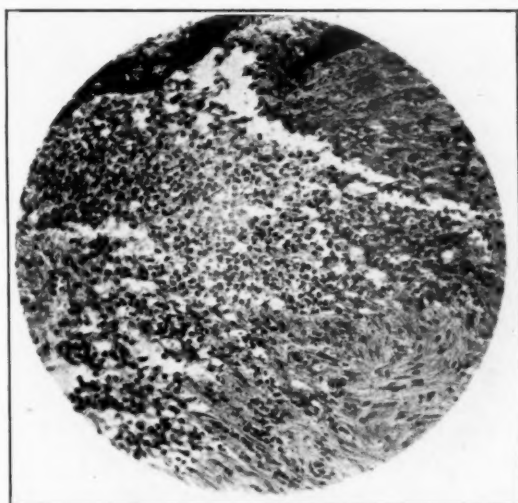


Fig. 5.—Acute thrombophlebitis of cord vein. Leucocytic infiltration in the interstices of the muscle wall and intima. Meshwork of fibrin and leucocytes projecting into the vessel lumen.

As a result of this infection of placental vessels, fetal bacteremia may develop (Kobak) and neonatal illness or death occur.

The manner in which the inflammatory lesion starts at the margin of the cervical aperture emphasizes again the importance of the cervix as an etiologic focus of disease.

CANCER PREDISPOSING LESIONS

(The conclusion of labor terminates the obstetrician's chance to forestall the ravages of cervical infection.) The patient's fate, thenceforth, depends upon the strength of her resistance and upon the virulence of the bacteria which inhabit her birth canal.

The attention of the physician is now directed to measures of restoration, restoration of the pelvic floor and perineum to their cus-

tomary configuration, and particularly of the cervix to a normal nulliparous-like contour. (To precisely the same degree that prenatal treatment of the infected cervix is necessary for the prevention of puerperal infection, so also is postnatal restoration of the cervix required for the prevention of cervical cancer.

If one could safely and satisfactorily expose and suture the cervix after delivery, primary repair of this channel would be the method of choice. However, it has been our experience that such unwarranted risks are taken in the exposure and manipulation of the cervix immediately after delivery that more is lost in the routine application of this procedure than is gained in the few cases that are found to require suture. We find very few cases of extensive cervical damage when the course of labor has been properly conducted. Our immediate repair of the birth canal is limited, therefore, to the vaginal wall and perineum unless traumatic hemorrhage calls for suturing at higher levels.

To the minor degrees of cervical trauma, treatment with the electric cautery during the postnatal period is particularly applicable. The application is made at first rather lightly on the sixth or eighth week postpartum. The treatment is repeated every three weeks until all areas of laceration and erosion are epithelialized. An alternate method of dealing with these lesions is the conization method of Hyams.

More extensive degrees of cervical damage are amenable to correction by intermediate or secondary repair. The intermediate repair may be performed on the fifth to the eighth day of the puerperium, depending upon the speed of the patient's convalescence. The result of the repair of the succulent puerperal cervix is quite satisfactory. The operation is often followed by a morbid temperature reaction, however, and the stay in the hospital is considerably prolonged. Repair performed several months after delivery, secondary repair, is the safest and best method of correcting extensive cervical damage. For this purpose patients are readmitted to the hospital after the period of lactation is completed.

It is now recognized that the obstetrician in his follow-up examination of the obstetric patient and in his program of annual health examinations has an excellent opportunity to make the early diagnosis of cervical malignancy. Certainly he has it within his power to educate his patients in the importance of annual health examinations. These annual health examinations have become of greater significance as more scientific methods of study have been devised. Particularly is this true in the detection of cervical pathology. The findings of pelvic examination have not been hitherto completely satisfactory. Lesions have been detected only in their fully developed state. As a result, out of five women upon whom a diagnosis of carcinoma of the cervix is made, four die within five years.

(It is now agreed that if we are to lower the mortality rate from carcinoma of the cervix, it will have to be done by making the diagnosis earlier, and by prophylactic measures. Surgery and radium in the treatment of this disease entity seemingly have reached their height of usefulness.) In spite of propaganda to the laity, and the furtherance of the regular medical examinations, there has been no appreciable reduction of the death rate. While it is true that more and more cases are being diagnosed than there were ten years ago, nevertheless they are being seen too late for effective treatment to alter materially the percentage of cures.

It has been said that a latent period of carcinoma extends over a period of years before the disease becomes a clinically demonstrable entity. Bland states that mice subjected to long-continued irritation by tar will develop newgrowths in about six months, one-sixth the normal span of a mouse's life. Applied to man, this would correspond to from ten to fifteen years. This statement is supported by observations on occupational carcinoma, which do not manifest themselves until ten to fifteen years after the occupation has been started.

Periodic vaginal examinations, as they are done today, and biopsy of the cervix are doing much to bring individuals to early treatment. As a rule, however, it is not early enough. If we are to detect the small areas of early carcinoma which are present before ulceration occurs, we must look to methods not in general use. To this end Hinselmann designed the "colposcope" and reported upon its use in 1928. Closely following this treatise Schiller advocated the use of Lugol's solution for the detection of clinically undistinguishable carcinoma of the cervix. By these methods, it is claimed, a suspicious area is more easily detected, and biopsy more accurately procured.

TECHNIC OF TEST

We began the study of the cervix with the Schiller test some five months ago. After experimenting with the colposcope, various types of lenses and binoculars suggested by Hirst, we developed the following procedures:

A preliminary examination is made without lubricating the fingers, and a speculum is inserted without the use of lubricants. The cervix is wiped clean of mucus with a swab of absorbent cotton, care being taken not to traumatize the epithelium. The same type swab is immersed in full strength Lugol's solution (other dilutions have been tried without the same degree of success) and the entire cervix is bathed, making sure that the surrounding areas are included. Especially are we careful to distend the folds surrounding the cervix so that the entire area is well stained. After a minute the excess is removed with absorbent cotton. The magnifying apparatus is then set up and the cervical epithelium inspected. Biopsy is taken from stain deficient areas. For this purpose the cutting current loop is particularly well adapted. Bleeding is arrested by electrocoagulation or with the cautery.

If the cervix is examined without previous staining, any area which presents a dull, opaque, or wrinkled appearance against the normal glistening surface of the epithelium is the point at which a biopsy is taken.

Schiller advocates taking for diagnosis only a small piece of the surface epithelium. For this purpose he uses a spoon curette. He contends that the slightest change in the morphology of the epithelial cells is so characteristic that the diagnosis of carcinoma may be made from it alone. Other pathologists, including Dr. Baxter Crawford, do not agree with this view, contending that it is too meager a criterion.

Dr. Crawford states that a diagnosis of carcinoma cannot be made unless there is invasion of the basement membrane. For this reason we take a generous biopsy which dips into the underlying musculature.

Every postpartum cervix is examined by either or both of the above mentioned methods. Any cervix which appears abnormal during the antenatal examination is also referred for study. Contraindications to the use of the Schiller test and the colposcopic examinations are not often mentioned. If there is acute infection of the vaginal vault, puerperal bleeding, infection in the pelvis, or any gross pathology of the vagina or cervix, we deem it better not to make the test until a later date.

REPORT OF CASES

Total number of cases tested	109
Primigravida	30
Multigravida	79
Oldest	44
Youngest	15
Largest age group	20-35 years
Type of last delivery	
Spontaneous	96
Operative vaginal delivery	9
Caesarean Section	3
Number positive Schiller tests	15
Of the positive Schiller group	
Primigravida	0
Multigravida	15
Youngest	21
Oldest	44
Between 20-30	9
Between 30-40	3
Over 40	3
Biopsies taken	15
Biopsy report	
Chronic cervicitis	3
Thickened epith. surface	3
Hyperkeratosis	6
Keratinized areas	2
Fibroglandular polyps cervix (Fig. 9)	1
Treatment used	
Electric cautery	103
50 per cent silver nitrate	2
No treatment	4

It is our custom to have the parturient return for her first postpartum examination six weeks after delivery. At this time the usual postnatal examination is made and the patient is directed to return in one month. At the second visit the Schiller test and colposcopic examination are performed. Most patients require

some form of treatment of the cervix. The Schiller test and colposcopic examination performed at the sixth week postpartum are distorted by the edema and the results are not completely satisfactory.

Although no instances of early malignancy have as yet been discovered, this method of examination has disclosed a number of important lesions. We feel that progress has been made in the treatment of the postnatal cervix, and that these special studies fully justify the time and attention which are devoted to them.

SUMMARY

A résumé of the management and treatment of the cervical lesions which complicate obstetric practice has been presented. The responsibilities of the obstetrician in this connection have been pointed out. Special attention has been directed to six points:

1. The importance of detecting cervical infection and recognizing its etiologic relationship to puerperal infection.
2. The efficacy and safety of treatment of the cervix during the period of pregnancy.
3. The necessity of pursuing a conservative and thoughtful plan of tactics during the course of labor.
4. The rôle of the obstetrician in restoring the birth canal to natural contour and integument.
5. The importance of cautery treatment or, when indicated, of operative repair during the postnatal period.
6. The value and the method of application of new methods of diagnosis in early carcinoma of the cervix.

The authors wish to express their gratitude to Dr. P. Brooke Bland for his interest and material help in carrying on these studies. They are also deeply indebted to Dr. Baxter Crawford and the personnel of the hospital laboratories for their valued contributions in the study of pathologic material.

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VERATRUM VIRIDE IN THE TREATMENT OF ECLAMPSIA

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NOTWITHSTANDING the great strides made in recent years toward reducing both the frequency and the severity of the "toxemias" of late pregnancy, they are still met with only too often, and exact a toll much too large from childbearing women. The most dramatic, and at the same time the most severe, type of "toxemia" is eclampsia. Recent mortality statistics show that eclampsia and other toxemias of late pregnancy rank along with sepsis as a cause of maternal deaths. DeLee¹ says: "Over 20 per cent of women afflicted with eclampsia die, and this has been hardly affected by changes of treatment in the last hundred years." Williams² places the figure at 20 to 25 per cent. However, most large clinics today report much better results than this.

At present the majority of systems of treatment of eclampsia are based upon either the Dublin or the Stroganoff method. Lazard³ has treated a large series of cases with intravenous administration of magnesium sulphate with comparatively good results. A quarter of a century ago veratrum viride was considered as almost specific in some parts of the country, but fell into disrepute because it was abused. However, veratrum viride (under the trade name Veratrone—Parke, Davis & Co.) has been the basis of the treatment of eclampsia at the Cincinnati General Hospital for many years. The method of treatment has been modified from time to time as new therapeutic agents were introduced, but has remained nearly the same for the last eight years. The results have been so satisfactory, when compared with results obtained with other methods of treatment, that it is felt they are worth reporting, along with an outline of the treatment used.

The cases reported in this series are consecutive cases of so-called eclampsia. The diagnosis was based upon the following points: (1) Pregnancy of at least five months' duration, or pregnancy of at least five months' duration terminated no more than ten days before the first convulsion; (2) hypertension; (3) albuminuria; (4) convulsions, or history of convulsions, as many patients were not actually seen in the convulsive seizures; and (5) coma following the convulsions.

TREATMENT

The treatment was as follows: (1) Veratrum viride, by mouth, by hypo, or both; (2) magnesium sulphate, 50 per cent solution, intramus-

cularly; (3) magnesium sulphate by mouth; (4) forcing of fluids, by mouth, hypodermoclysis, or intravenous injection; (5) alkalies by mouth, sodium bicarbonate and sodium citrate; (6) low protein diet; (7) sedatives as needed for restlessness, analgesics and anodynes during labor, as needed; and (8) in the predelivery cases, treating the pregnancy conservatively.

1. "Veratrone," 5 to 15 minims by hypo or deep injection is given as soon after the first convulsion as possible. This is repeated as often as is necessary to keep the pulse below 80, or the blood pressure at least 20 mm. below the convulsive level. The usual case requires one to three doses at ten- to fifteen-minute intervals, then doses every one, two, or three hours until the patient is well over the acute stage. Oral administration of slightly larger doses, 10 to 20 minims, may replace the hypodermic injections as the patient recovers.

2. Magnesium sulphate, 50 per cent solution, 10 to 20 c.c. is given by deep injection immediately following the first dose of veratrone. This is repeated in smaller doses, 2 to 5 c.c., every six hours, three times a day, and twice a day, on successive days, as the acute attack subsides.

3. One-half to one ounce of saturated solution of magnesium sulphate is given by mouth twice a day.

4. Fluids are forced by mouth as soon as the patient is conscious. In the meantime 2,000 to 3,000 c.c. of saline are given by hypodermoclysis if the patient is over the convulsive stage but still comatose. Intravenous injection of 100 to 500 c.c. of glucose, 5 to 50 per cent, is frequently used.

5. Alkalies are given by mouth to conscious patients in doses of 60 to 120 gr. three to six times a day. Fruit juices, well sweetened, are administered at frequent intervals, when the patient can be aroused enough to drink.

6. A low protein diet, consisting chiefly of fruit juices, vegetables and bread, is allowed as soon as the patient feels hungry, and is apparently in no immediate danger of convulsions.

7. Chloral, bromides, or one of the barbiturates are given in appropriate doses to those patients who become restless during recovery from the acute stage. A modified Gwathmey technic is used during labor. Ether is used sparingly at the time of delivery.

8. In the antepartal case, no attempt is made to induce labor until the patient is well over the acute stage, or shows marked resistance to treatment. In the patient who responds to treatment, labor is induced twenty-four to seventy-two hours after the acute attack has subsided. In this series of cases there were seventy-one patients with convulsions before delivery. The types of induction used in these patients were as follows:

No induction needed	34
Braun bag	19
Caster oil and quinine	5
Digital "stripping membranes"	4
Rupture of membranes	1
Castor oil only	1
Castor oil and quinine, followed by bag	1
Cervix packed	1
Died undelivered	5
	<hr/>
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The methods of delivery in the predelivery cases were as follows:

Spontaneous delivery	38
Low forceps	12
Midforceps	4
High forceps	1
Scanzoni	2
Breech	5
Version and extraction	4
Postmortem cesarean section	2
Died undelivered	3
	<hr/> 71

Pitocin is used as the ecbolic after the completion of the third stage of labor.

The usual precautions are used during the convulsions. Biting of the tongue is prevented by a suitably padded gag. The throat is kept free of mucus. The patient is not restrained during a convulsion, except so far as is needed to prevent self-injury by falling or striking the bedposts. No anesthetic is used for the control of the convulsions. Acute cardiac failure is the only indication for venesection. A catheterized urine specimen is obtained as soon as practical. A large soap water enema is given as soon as the patient can cooperate.

An occasional patient was subjected to spinal puncture. In three cases, magnesium sulphate solution was injected intraspinally. Two patients received magnesium sulphate solution intravenously. It is felt that colonic irrigations are of distinct value in certain types of cases, but because of limited nursing facilities this procedure has not been carried out routinely. Because of circumstances, none of these patients were isolated, but were kept on the open thirty-bed ward, under the observation of internes, and general duty and student nurses. Pulse and blood pressure readings are taken at frequent intervals, and any sign of impending convulsions is carefully investigated.

RATIONALE OF THERAPY

1. The cause of eclampsia is, of course, the products of conception, since eclampsia gravidarum, by definition, never occurs in the absence of conception. How the products of conception produce eclampsia is wholly unknown. Many theories have been advanced to explain the phenomenon, and new theories are reported almost yearly. Yet all that can be demonstrated unequivocally are the results of the "toxemia."

Hypertension is one of the outstanding and constant clinical findings in eclampsia. It is a sign of increased vasoconstriction. Theoretical evidence of this is offered by Fishberg⁴ when he says that "... the only mechanism of protracted hypertension that harmonizes with the known facts, and has a sound physiologic basis, is a widespread or perhaps universal increase in the tonus of the arterioles." On the clinical side Haselhorst and Mylius⁵ have seen and photographed intermittent and sustained abnormal constriction of the blood vessels of the retina. The cause of the vasoconstriction is, directly or indirectly, the cause of eclampsia. This excessive vasoconstriction may possibly be caused by hyperfunctioning of the postpituitary, as suggested by Hofbauer in 1918,⁶ and reiterated in 1933.⁷ The work of Anselmino, Hoffmann, and Kennedy⁸ and others seem to lend support to this theory. At any rate

the vasoconstriction gives rise to a train of pathologic events. A hypertension develops which throws an added strain on the heart and blood vessels, either of which may give way, with disastrous results. Furthermore, the vasoconstriction itself, we may postulate, leads to anemia of the tissues, with suboxidation, retention of waste products of metabolism, and eventually edema. The edema, by pressure, leads to further vasoconstriction. Thus a vicious cycle is established.

This vicious cycle must be interrupted at some point. In this series, this has been accomplished with veratrone. That veratrum viride has a vasodilating action is attested by Cramer,⁹ who says: "Veratrum viride is therapeutically valuable, as in suitable doses it affords a means of producing a lasting vasodilatation through acting reflexly on the vasomotor center." Solis-Cohen and Githens¹⁰ and Hare¹¹ also agree that there is a vasodilatation produced by the drug. This vasodilatation apparently results in an increased blood supply to the various organs. This encourages a more normal exchange of metabolites and at the same time allows more ready access of drugs such as dehydrators and alkalies. The edema of the brain, skin, and kidneys diminishes, so that cessation of convulsions, return of consciousness, diuresis, and diaphoresis result. Other effects of the drug, lowering of the blood pressure, slowing of the heartbeat and respiration, diarrhea, and vomiting, although marked and even alarming at times, are apparently harmless. The vomiting in particular is probably of definite value, as the loss of HCl tends to diminish the ever-present acidosis. It is certain that the benefits of the drug far outweigh these temporary disadvantages.

2. Magnesium sulphate by deep injection is used for its dehydrating and diuretic action. The deep injection method of administration eliminates the danger of acute respiratory paralysis, and permits a more sustained action.

3. Magnesium sulphate by mouth has a dehydrating action, by producing copious watery stools.

4. Fluids are forced because clinically this procedure seems to be helpful. Originally it was done with the idea of "washing out" the "toxin" from the blood, and encouraging diuresis. Theoretical support for this type of treatment has been advanced recently by Lashmet and Newburgh¹² and Lashmet,¹³ in dealing with patients with nephritic damage. The reasoning is that solids require water for their excretion through the kidney. If the amount of solid to be excreted is increased, then more water must be excreted. If this water is not supplied by ingested fluids, then fluids must be withdrawn from the tissues for this purpose. But the tissues in the eclamptic patient have become hydrophilic (Zangemeister¹⁵), possibly because of the retention of nonprotein nitrogen compounds (as suggested by Plass¹⁴), and do not give up their

fluids. Therefore if fluid is neither ingested nor freed from the tissues, the solids are retained, since they cannot be excreted. This chain of events is overcome by forcing fluids.

Hypodermoclysis is not used in the convulsive stage because of the danger of injury to the patient by the fixed needle. Relatively small amounts of hypertonic glucose are given intravenously. Large amounts are not used because of the danger of throwing a sudden strain upon the heart.

(5) Alkalies are administered for their diuretic effect and their power to decrease acidosis. They are also useful in combating infection, to which eclamptic patients are unusually susceptible. In general they are used "... for changing the 'milieu' of the organism" (Hofbauer⁷).

6. The low protein diet is carried over from the treatment of nephritis. Its value is being questioned by many authorities, but until this type of diet is proved actually harmful, continuation of its use is justified on clinical grounds alone.

7. Sedatives are not used in the control of the convulsions, and only rarely are they needed for the restlessness which sometimes follows the convulsive stage. The patient "knocked out" with sedatives cannot drink fluids, which we are very anxious for her to do. The comatose patient needs no sedatives; indeed, her vital functions are already at a dangerously low level. The patient under sedatives may slip over into coma without warning, and thus deprive the attendant of this warning of the need of more drastic treatment. Finally, the patient in labor should not receive large doses of sedatives because of the danger of asphyxiating the newborn.

8. Most authorities agree that the labor and delivery should be conducted along conservative lines.

COMMENT ON THE EFFECTS OF VERATRONE

The effect of the hypodermic injection of a therapeutic dose of veratrone is startling, and may cause undue alarm to those unused to seeing it. The blood pressure falls rapidly, sometimes going as low as 50 systolic. This marked fall is transitory, but is followed by a more or less prolonged period during which the pressure is well below the original level. The heartbeat is slowed to 40 per minute in some patients, but soon picks up, and remains at 60 to 80 until the effect of the drug has worn off. The pulse rate usually follows the blood pressure level fairly closely. Atropine or morphine or both are antidotes for *veratrum viride*; neither was needed in this series.

Vomiting is an early effect. The vomitus is copious and usually green or black, possibly indicating the excretion of toxic materials from the liver. The degree of vomiting varies with the individual susceptibility of the patient.

The respiration is always slowed considerably, but never to such a degree as to be harmful.

It should be emphasized that the individual susceptibility to the drug is very marked. For this reason, the treatment cannot be absolutely standardized. The size and number of doses can be gauged only by the reaction of the patient to it.

RESULTS

There are 121 consecutive cases of eclampsia in this series. The relation of convulsions to labor was as follows:

Prepartum	43
Intrapartum	17
Pre- and intrapartum	3
Intra- and postpartum	2
Pre- and postpartum	3
Pre-, intra-, and postpartum	3
Postpartum	50
	<hr/> 121

Convulsions occurred before delivery in seventy-one cases, or in 58.7 per cent of the cases in this series. Of the fifty postpartum cases, twenty-three delivered and had convulsions before admission.

The total number of maternal deaths in this series is twelve, or 9.92 per cent. A brief résumé of the deaths is as follows:

CASE 1.—Admitted in coma following several convulsions. Convulsions controlled. Delivered spontaneously a macerated six-month fetus. Died twelve days postpartum. Necropsy showed acute purulent endometritis, infarct of the upper lobe of the right lung, and miliary abscesses of the right kidney.

CASE 2.—Admitted in coma following many convulsions. Examination of chest showed lobar pneumonia. Spinal fluid bloody, and under increased pressure. Died twenty-seven hours after admission. Necropsy not done. No convulsions after treatment was started.

CASE 3.—Admitted in coma following many convulsions. No convulsions in the hospital. Regained consciousness, went into labor spontaneously, but died on the way to the delivery room. Necropsy showed marked necrosis of the liver.

CASE 4.—Admitted in coma, eighteen hours postpartum, after repeated convulsions. Blood pressure 90/60. Died five and one-half hours after admission, of pulmonary edema and cardiac failure. Necropsy showed bronchopneumonia and pulmonary edema.

CASE 5.—Admitted semicomatose. Delivered spontaneously in ten hours. Developed convulsions seventy hours postpartum, had three, and died sixteen hours later. Necropsy showed bilateral cerebral hemorrhages, and fatty degeneration of the liver, with multiple subcapsular hemorrhages.

CASE 6.—Admitted in coma after many convulsions. Died twenty minutes after admission. No necropsy allowed.

CASE 7.—Admitted in coma following eleven convulsions. Convulsions controlled promptly, patient regained consciousness, went into labor, and delivered spontaneously. Temperature of 102° two days postpartum with signs of bronchopneumonia. Died four days postpartum of acute cardiac failure and bronchopneumonia. No necropsy.

CASE 8.—Admitted three days postpartum following series of convulsions. In coma on admission. Had convulsions forty hours and six days after admission. Developed marked rigidity of the neck and severe urinary tract infection. Died nine days after admission. No necropsy.

CASE 9.—Admitted conscious, but severely toxic. No history of convulsions. Improved under treatment. Died in her first convulsion while Braun bag was being inserted. No necropsy.

CASE 10.—Admitted in coma following several convulsions. Responded well to treatment. Braun bag inserted. Had two convulsions during labor. Delivered spontaneously, but immediately went into coma, and died twenty hours later. No necropsy.

CASE 11.—Admitted in coma following six convulsions. Convulsions controlled after one immediately on admission. Died of acute pulmonary edema twelve hours after admission. No necropsy.

CASE 12.—Admitted in coma following many convulsions. No convulsions in hospital. Flaccid paralysis of entire right side on admission. Spinal tap unsuccessful because of marked edema of back. Died in coma sixty hours after admission. No necropsy.

Case 6 received no antieclamptic medication. Of the 120 other patients in the series, 60 per cent had no convulsions after treatment was started, 15.8 per cent had only one convulsion, and 24.2 per cent had more than one convulsion after treatment was started.

There have been no deaths in the last fifty cases of eclampsia.* We feel that better prenatal care and earlier hospitalization have played some part in this.

SUMMARY AND CONCLUSIONS

The treatment of eclampsia at the Cincinnati General Hospital is outlined.

Emphasis is placed upon the value of veratrum viride properly used. Proper use consists chiefly of individualization of dosage. The use is justified on theoretical grounds, and by the results obtained.

The results of the treatment are given. The gross mortality figure of 9.92 per cent in a series of 121 consecutive cases of eclampsia compares favorably with figures reported from clinics where other methods of treatment are used. No corrected mortality figure is given, because such a figure may be open to question.

The fact that no deaths have occurred among the last fifty patients in this series is explicable not only on the basis of careful treatment, but also on the basis of better prenatal care and earlier hospitalization in acute cases.

I wish to thank Dr. H. L. Woodward, my chief of staff, for his permission to review the cases presented above, and for his constructive criticism of this paper as a whole.

*Since these figures were compiled we have treated six additional patients with eclampsia without a death, reducing the gross mortality rate to 9.45 per cent and increasing to 56 the series without a mortality.

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A STUDY OF THE FETAL MORTALITY IN PATIENTS WITH ORGANIC HEART DISEASE

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PROPER medical management of the cardiac patient during pregnancy involves great sacrifice of her time, curtailment of her activity, and a considerable expense, over and above that incident to pregnancy in the normal subject. The risk of pregnancy to her life is not negligible, even under optimum conditions. In the past, medical and obstetric discussion of the question whether or not a cardiac patient should undertake pregnancy has concerned itself almost wholly with the maternal risk, without due consideration of the baby. It would seem that the probability of obtaining a live baby should be an important factor in such a decision. An unusual opportunity for study of the fetal mortality associated with this complication is afforded by the large number of patients with heart disease who have been treated at the Boston Lying-in Hospital.

1. MATERIAL

A special heart clinic has been in operation for fifteen years at this institution under the direction of Dr. B. E. Hamilton.^{1, 2, 3} During routine prenatal examinations all patients who present signs or symptoms which might be referable to heart disease are directed to this clinic for cardiac diagnosis. Those found to have organic heart disease are followed by the cardiologist throughout pregnancy, delivery, and puerperium. In addition to the patients from our own prenatal clinics, a large number of cardiac patients are referred to the heart clinic by the general hospitals of the community, by practitioners who do their own

relatively normal obstetrics, and by other obstetric institutions in which religious principles prohibit contraceptive advice, therapeutic abortion, and sterilization.

The material to be presented in this paper has been obtained from an analysis of all the cardiac patients cared for during the past ten years. The heart lesion has proved to be of rheumatic origin in over 90 per cent of the cases. No patient who had organic heart disease has been excluded. On the other hand, no patient has been included unless there were certain minimum clinical findings: such as (1) demonstrable cardiac enlargement, (2) persistent diastolic murmur, or (3) a major disorder of the beat, such as auricular fibrillation, flutter, or heart block. In doubtful cases free use has been made of the seven-foot x-ray plate, fluoroscope, and the electrocardiogram. All final diagnoses have been made by the consulting cardiologist.

2. GROSS FETAL MORTALITY FOR THE WHOLE GROUP

During the ten-year period of this study, 598 patients with organic heart disease have been treated and delivered in the hospital. Of this group, 514 were delivered after the twenty-eighth week, and the fates of these viable babies will be presented in detail. However, it would seem to be of considerable interest to present first the gross fetal loss for the whole group, including spontaneous and therapeutic abortions. This will be found in Table I.

TABLE I. GROSS FETAL MORTALITY FOR ALL CARDIAC PATIENTS IN THE GROUP

Total pregnant cardiacs in the series	598
Total babies	606*
Died undelivered	3
Abortions, spontaneous	14
Abortions, therapeutic	67
Total babies who reached viability	522
Babies discharged living and well	484
Stillbirths	15
Neonatal deaths	23
Gross fetal loss for the whole group	20.13%
Fetal mortality among viable babies (Born after twenty-eighth week)	7.28%

*This figure includes abortions and 8 pairs of twins.

The gross fetal loss (20.13 per cent) is enlightening, and at first thought rather discouraging, although it should be pointed out that more than half of the babies lost were from spontaneous and therapeutic abortions. Abortions are not ordinarily included in computing fetal mortality. Nevertheless, this gross figure is of some importance, for it shows that without selection, cardiac patients have only an 80 per cent chance of having a baby that survives. However, if one excludes the relatively small group of cardiac patients with such severe damage that the risk of pregnancy to their own lives is excessive, it will be shown

later that the prospect of obtaining a living baby is excellent. On the basis of history and physical examination, it is possible before the onset of pregnancy to recognize a large majority of these patients with heart lesions which are too severe to allow them to carry the strain of pregnancy. This point has been emphasized by Hamilton. Such patients whose cardiac condition clearly contraindicated pregnancy made up the great majority in the group upon whom therapeutic abortions were performed, and a considerable proportion of those whose pregnancies were terminated because of failure while the baby was still premature.

3. FETAL MORTALITY FOR BABIES DELIVERED AFTER VIABILITY

There were a total of 514 patients in whom pregnancy terminated after the twenty-eighth week. In the cases of fifty-three it was necessary to deliver the patient prematurely because of the condition of the heart (usually because of the occurrence of congestive failure). In the others, either labor was spontaneous or elective cesarean section was done at term. The fetal mortality for these viable babies is presented with some detail in Table II.

TABLE II. FETAL MORTALITY FOR ALL VIABLE BABIES—IRRESPECTIVE OF METHOD OF DELIVERY OR CARDIAC CONDITION OF THE MOTHER AT DELIVERY

	DURATION OF PREGNANCY IN WEEKS AT DELIVERY		
	29 THROUGH 35 WEEKS	AFTER 35 WEEKS	TOTAL FOR GROUP
Total babies delivered	36	486	522
Discharged living	17	467	484
Stillborn	2	13	15
Neonatal deaths	17	6	23
Gross fetal mortality	52.77%	3.91%	7.28%

The mortality among the babies delivered after the thirty-fifth week (3.91 per cent) compares favorably with the general fetal mortality for the hospital (excluding prematures). Although the prematures made up less than 7 per cent of the whole group, they accounted for half of the loss of babies. As will be shown in the following section, the mortality in the premature group is unusually high.

4. FETAL MORTALITY IN THE PREMATURE GROUP

The total mortality among the premature babies of this group of cardiac mothers is considerably higher than that for prematures in general. Of the 36 viable babies delivered before the thirty-sixth week of gestation, only 17 survived. Of those lost, only 2 were stillborn, and 17 died subsequent to delivery. Thus, of 34 premature babies born alive, 50 per cent subsequently died. What are the factors which have contributed to this high neonatal death rate? It is not to be explained upon an undue proportion of very premature babies (at least so far as weight is concerned), for of the 17 babies who died, 12 weighed over 4 pounds,

4 between 3 and 4 pounds, and only 1 weighed less than 3 pounds. Nearly all of the fatalities occurred within the first forty-eight hours. Death was usually preceded by cyanosis and labored respiration. At autopsy little was found except for atelectasis, evidence of the aspiration of amniotic fluid, and the sequelae of asphyxia.

The type of delivery seems to have been one important factor. In Table III is presented the fetal mortality for all babies whose birth weights were less than five pounds, related to the method of delivery.

TABLE III. COMPARISON OF THE FETAL MORTALITY IN BABIES UNDER FIVE POUNDS DELIVERED THROUGH THE PELVIS AND BY CESAREAN SECTION

	TYPE OF DELIVERY	
	PELVIC	CESAREAN
Babies discharged living	13	4
Neonatal deaths	2	11
Stillborn	0	0
Fetal mortality	13.33%	73.33%

Of the fifteen premature babies delivered through the pelvis, the mortality was only 13.33 per cent, whereas of a like number delivered by cesarean section, 73.33 per cent died. These findings for premature babies of cardiac mothers confirm those of Clifford.⁴ In his studies of premature infant mortality he has shown that the neonatal death rate is much higher after cesarean than after any type of pelvic delivery, except for breech extraction. In his series of prematures of cardiac mothers, the neonatal mortality was 75 per cent for those delivered by cesarean, and 30 per cent for vertex presentations delivered normally or by low forceps.

The precise reasons why these prematures delivered by cesarean section have done so poorly are not entirely clear. However, several factors which would seem to bear some relation should be mentioned. First, as noted above, autopsies in the fatal cases show little other than atelectasis, evidence of aspiration of amniotic fluid, and the sequelae of asphyxia. Most of the cardiac patients delivered by cesarean section of premature babies were either in congestive failure at the time of delivery, or had been in failure, and had partially reestablished compensation. Thus, it is possible that many of these babies had suffered from mild asphyxia prior to, as well as during, delivery. Then, too, many of the patients were given morphine in preparation for operation. As has been shown by Clifford, the neonatal mortality of prematures whose mothers have been given morphine prior to delivery is very high. Another point may be mentioned, which may have some bearing on the asphyxial nature of the fetal cases. Many of these cesarean sections were done under local anesthesia, a procedure which necessitates gentle and somewhat slower operating than usual. The slight delay in the extraction of these babies from the uterus may have added in some degree

to a preexisting intrauterine asphyxia. A number have required resuscitation. Morphia is no longer used in the preparation of these patients for cesarean section. Indeed, it is preferred to give no medication whatever in preparing the mother of a premature baby for delivery by cesarean section. The operation is now done either under local anesthesia or with a minimum of drop ether.

Of the group of prematures delivered through the pelvis, only two mothers were in mild decompensation, and morphia was given in only one case. These facts undoubtedly help to explain the much lower fetal mortality in this group.

There is one other suggestion which may have some significance in the explanation of the very high neonatal death rate among the prematures delivered by cesarean section. Most of the babies in this group have been very well nourished. The mothers of the premature cesarean babies have usually been in bed for weeks or months before delivery, a circumstance which might tend to produce well-nourished infants. Possibly many of these babies have been more premature in weeks of gestation than the birth weights would indicate. One certainly sees the opposite condition fairly commonly in the thin premature baby of the toxemic patient, which, on the basis of weight alone, should be more premature than one would expect from the duration of pregnancy. Clifford states that these prematures of the toxemic patients, once they are born alive, have as good a chance for survival as any premature. His chart actually shows that the mortality among the prematures born alive of toxemic mothers is slightly less than that of similar babies born of presumably normal mothers, and much less than for those of any other group. Very likely this may be explained by the relatively greater maturity of the thin toxemic baby in actual weeks' duration of pregnancy, in comparison with its birth weight.

In Table III the conventional five pounds was used as the criterion of prematurity. Because it was suspected that the premature babies of cardiac patients (the activities of whom have been greatly restricted during pregnancy) might be somewhat heavier than other prematures on a basis of weeks' duration of pregnancy, the fetal mortality of all babies born of cardiac patients, regardless of the type of delivery, has been tabulated according to estimated weeks' duration of the pregnancy at the time of delivery. The result is seen in Table IV.

The result of the tabulation in Table IV is surprisingly consistent. For comparison, the same data are presented for the mortality of these babies on a basis of birth weight. This may be seen in Table V.

Comparing the two tables, it would appear that estimated weeks' duration of pregnancy is a more reliable index of the chance of survival than the actual birth weight. The former should be considerably more reliable than an *estimate* of the size of the baby in utero by palpation. For this reason it would appear that, at least when the duration of the

TABLE IV. NEONATAL DEATH RATE FOR ALL BABIES BORN ALIVE OF CARDIAC MOTHERS RELATED TO ESTIMATED DURATION OF PREGNANCY AT TIME OF DELIVERY

	ESTIMATED WEEKS' DURATION OF PREGNANCY AT DELIVERY				
	TO 32 WK.	33-34	35-36	37-38	39-40
Lived	4	8	20	73	372
Died	8	5	4	5	0
Per cent mortality	67	38	17	6	0

TABLE V. NEONATAL DEATH RATE FOR ALL VIABLE BABIES OF CARDIAC MOTHERS RELATED TO BIRTH WEIGHT

	BIRTH WEIGHT IN POUNDS				
	LESS THAN 3	3-4	4-5	5-6	6 plus
Lived	0	5	12	52	408
Died	2	4	8	5	2
Per cent mortality	100	44.4	40	8.77	0.49

pregnancy by dates has been consistent with obstetric examination, the likelihood of survival may be more accurately prognosticated on the basis of weeks' duration of pregnancy than by estimated weight of the baby. Whether the method of measuring the occipitofrontal diameter of the fetal head in utero by x-ray⁵ will be of greater prognostic value remains to be seen. On the basis of the results shown in Table IV one may infer that the chance of survival is too small before the thirty-fifth week if the baby is to be seriously considered; the chance is reasonably good in the thirty-fifth and thirty-sixth weeks; and after the thirty-sixth week the chance of survival is excellent.

5. THE RELATION OF TYPE OF DELIVERY TO THE FETAL MORTALITY OF MATURE BABIES

There were 462 patients delivered either after the spontaneous onset of labor, or by elective cesarean section at term. The various types of delivery and the fetal mortality of each are shown in Table VI.

TABLE VI. THE FETAL MORTALITY AFTER THE VARIOUS TYPES OF DELIVERY

TYPE OF DELIVERY	TOTAL BABIES DELIVERED	DIS-CHARGED WELL	STILL-BORN	DIED	PER CENT MORTALITY
Normal	179	168	9	2	6.15
Forceps (24 midforceps)	210	208	2	0	0.95
Breech extraction, version	24	21	1	2	12.50
Cesarean at term	57	56	1*	0	1.75

*This stillborn baby was known to be dead before the operation which was done for abruptio placentae. Thus, the corrected fetal mortality for cesarean section at term for this series was nil.

It will be seen from Table VI that the gross fetal mortality following normal delivery is over six times that following forceps. This does not present the case for normal delivery quite fairly, since there were among the nine stillbirths delivered normally five monsters and one

macerated fetus. However, the fetal mortality after forceps delivery of 0.95 per cent speaks strongly in favor of this method as a routine in all cases in which spontaneous delivery does not occur within a few minutes after full dilatation is reached. There is much to be said for low forceps delivery from the standpoint of the cardiac mother. The bulk of the strenuous physical exertion of labor is expended in the expulsive stage, after full dilatation has been reached. It would seem then that the use of low forceps to eliminate the exertion incident to the second stage of labor is a very reasonable precaution in patients with heart disease. Forceps delivery serves the best interests of both mother and baby.

In view of the high fetal mortality among premature babies delivered by cesarean section, it is somewhat reassuring to find that among 57 cesarean sections performed on cardiac patients at or near term, there was but one baby lost. This baby was known to be dead before the operation which was performed because of premature separation of the placenta. Excluding this one case, there were 56 consecutive cesarean sections at term without a fetal death.

6. THE INFLUENCE OF DECOMPENSATION AT THE TIME OF DELIVERY UPON FETAL MORTALITY

It has been found by Clifford that the highest mortality among premature babies is in that group delivered of decompensated cardiacs by cesarean section. He found that the mortality rate in a small series of such babies was about 80 per cent. In this study, a patient was not considered to be decompensated unless she had at least persistent râles at the lung bases. The fetal mortality according to type of delivery and duration of pregnancy at the time of delivery is given for the failure and nonfailure groups in Table VII.

TABLE VII. THE INFLUENCE OF FAILURE IN CARDIACS AT THE TIME OF DELIVERY ON THE FATE OF THE BABY

	DELIVERED FROM 29 THROUGH 35 WEEKS		DELIVERED AFTER 35 WEEKS	
	IN FAILURE	NO FAILURE	IN FAILURE	NO FAILURE
<i>Pelvic Deliveries:</i>				
Babies discharged alive and well	2	11	21	355
Babies died	0	3	1	0
Babies stillborn	0	2	3	8
Total	2	16	25	363
Fetal mortality	0	31%	16%	2.20%
<i>Cesarean Deliveries:</i>				
Babies discharged alive and well	1	3	20	64
Babies died	7	7	0	4
Babies stillborn	0	0	0	2
Total	8	10	20	70
Fetal mortality	87.5%	70.0%	0%	8.57%

The mortality of 87.5 per cent in this series for prematures delivered of cardiac patients in failure by cesarean section confirms the findings of Clifford. However, the fetal mortality after pelvic delivery of mothers in failure was not so great as might have been anticipated. Strangely enough, there were twenty babies who were delivered after the onset of the thirty-sixth week by cesarean section of mothers in congestive failure. All of them survived. It should be mentioned that most of the patients in severe failure were delivered by cesarean section, whereas in the group delivered through the pelvis the decompensation was usually mild. In the whole group of fifty-five patients delivered while in congestive failure, there were only five stillborn babies.

COMMENT

Study of the fetal mortality of this group of patients has brought out a number of points which parallel those already gleaned from investigations of the maternal risk in cardiac patients. The greatest fetal loss occurs in that rather small group of patients with severe heart lesions, most of whom, had they sought competent medical attention, could have been advised that their heart reserve was too low to withstand the strain of pregnancy. An unexpectedly large number of these cardiac patients who have had medical attention have either had no advice as regards the risk of pregnancy, or have failed to heed such advice. On the other hand, patients with well-compensated heart disease, without history of past failure or embarrassment, seem to tolerate pregnancy well under strict medical regime. For this large group of women the fetal mortality does not differ materially from that for normal subjects.

There will probably always remain a borderline group whose past histories reveal no failure and no gross loss of reserve, who will fail for the first time in the middle of pregnancy. Their babies are extremely important, for most of them will never subsequently be in as good condition to withstand the strain of pregnancy. These patients usually fail some time after the twentieth week. With a rare exception, they improve to a varying extent under bed rest and treatment. A few do so poorly that one is obliged to disregard the baby and interrupt pregnancy when improvement has become maximum. Another small group do so well that one may even send them home to be followed closely with instructions to lead a bed- and chair-life until near term.

Then there is that great middle class: patients whose condition improves sufficiently that one feels warranted in watching them from day to day under hospital conditions until the baby is viable. These patients present the greatest difficulty from the standpoint of fetal mortality. The problems are two: when has the baby a good chance for survival, and how shall the patient be delivered? As regards the viability of the baby, if the expected date of confinement is known with reason-

able certainty, it would appear that waiting until the thirty-sixth week, and if possible, the thirty-seventh, offers a more certain prognosis than estimation of the size of the baby. In these cases in which the mother is on the edge of failure, but not in severe or gross failure, there would appear to be little likelihood that the baby will succumb to asphyxia in utero. Of fifty-five patients delivered while in congestive failure, there were only five stillborn babies. The mothers of these babies were in severe failure. The choice of method of delivery is equally troublesome. As far as the baby alone is concerned, pelvic delivery which implies induction of labor is the method of choice. One hesitates to attempt the induction of labor on such a patient. Induced labors so far from term are often long and tiring and cardiac patients should not be subjected to such an ordeal. Rupture of the membranes is not infrequently ineffectual, and even bagging may fail. There are reports in the literature of artificial rupture of the membranes having been immediately followed by acute and fatal congestive failure in cardiac patients. On the other hand, in our past experience at least, cesarean section offers the poorest chance for the premature baby of the cardiac mother. Nevertheless, certainly for primiparas, and probably also for multiparas whose condition does not permit of awaiting term delivery, cesarean section will doubtless remain the method of choice. It would appear that premature babies do not tolerate well the moderate degree of asphyxia incident to the combination of impaired maternal circulation and cesarean delivery. The prognosis for babies born after the thirty-fifth week of pregnancy when the mother is on the edge of, or in, mild congestive failure is very much brighter. The high fetal mortality which has been experienced in the past in this premature group can probably be reduced considerably by getting all patients whose cardiac condition allows consideration of the baby into or beyond the thirty-sixth week. Quick removal of the baby under local anesthesia or after a minimum period of inhalation anesthesia without preliminary medication, especially without morphia, may also aid in reducing these premature deaths.

So far as the term babies of the compensated cardiacs are concerned, normal delivery, low forceps, and cesarean section all offer an excellent prognosis. In this series low forceps had the least mortality with only two stillborn babies and no neonatal deaths in 210 deliveries. In view of the fact that forceps delivery takes most of the strain from the second stage of labor, it is equally to be recommended from the standpoint of the mother.

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HEMORRHAGE IN LATE PREGNANCY*

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UTERINE hemorrhage in the last trimester of pregnancy is one of the most formidable complications with which the obstetrician has to deal. It takes its place with infection and toxemia, to make up the three main causes of maternal death, while the fetal mortality approaches 50 per cent. Good results are very dependent upon a prompt diagnosis and correct treatment instituted as soon as the diagnosis is made.

It is our aim to individualize each case and employ that method which seems best fitted to the case, rather than routine procedures. Judgment and skill thus exercised are the factors which increase or decrease the mortality rate.

Bleeding in late pregnancy is of great significance and should be regarded as of the most serious nature until proved otherwise. Therefore we should hospitalize a bleeding patient at once, get her grouped for blood transfusion, and establish a diagnosis. If the baby has not reached viability and the bleeding is only slight, the treatment may be compromised in some cases and the patient watched in the hospital. She should never be allowed to go home before she is delivered. Listed in this report is the case of a woman who bled only slightly and after a brief stay in the hospital, went home, only to return in a few days bleeding profusely and with the cervix dilated. She was quickly delivered by version and extraction, the uterus packed and venoclysis given, but she succumbed one and one-half hours after admittance. Attention must be called to an observation recently made by Rucker:¹ "A woman with placenta previa rarely bleeds to death from her first hemorrhage."

A careful study has been made of the hemorrhage cases occurring in the Obstetrical Department of the Evanston Hospital over a period of ten years, in order to judge the results of our management of this complication.

The patients in the group presented include (A) those bleeding from a normally situated placenta which we term "premature separation." This is the "abruptio placentae" of DeLee,² and the "ablatio placentae" of Holmes;³ and (B) those bleeding from a placenta situated near the cervical os, in the dilating portion of the uterus as palpated, or seen on examination: "placenta previa."

*Read before the Chicago Gynecological Society, December 21, 1934.

This report does not include patients in whom bleeding resulted from trauma to the cervix, a placental separation during delivery, bleeding following vaginal examination, or late second stage bleeding, but only those in which a definite diagnosis could be made.

When a vaginal examination is necessary to establish a diagnosis or determine the state of the cervix, it is resorted to, but only after everything is in readiness for rupture of the membranes, insertion of a bag or version. There is no place in our plan of treatment for cervical packing or vaginal tamponade. The value of such a procedure is questionable; it requires time and is too likely to lead to infection. Kellogg⁴ in a recent report of 437 cases speaks rather strongly against such practice. Rectal examination is also a dangerous practice if the case be one of placenta previa. Such an examination may start serious bleeding at a time when one is not able to cope with it.

During the ten-year period from January, 1924, to December, 1933, inclusive, there were 7,981 obstetric patients admitted to the Evanston Hospital, among whom hemorrhage was a complication in 95 cases, or one out of every 84 cases (1.2 per cent). Of these 95 cases, 35 were due to premature separation of the placenta, and 60 resulted from placenta previa. Thus, the incidence of premature separation was 0.43 per cent and of placenta previa was 0.75 per cent.

Before considering our treatment of these cases I wish to point out a number of factors or conditions which must be considered before the choice of procedure is made. If the case be one of placenta previa the following deserve much consideration: (1) Condition of the patient, blood loss, shock, etc.; (2) type of placenta previa; (3) state of the cervix; (4) parity and age; (5) period of gestation; (6) is the baby alive? (7) how many vaginal examinations? (8) are membranes ruptured and, if so, how long? (9) is the patient in labor and what is the progress?

Should the case be one of premature separation, two additional factors must be considered: *First*, the amount of placental separation and the state of damage to the uterine musculature. The extravasation of blood into the wall of the uterus might be sufficient indication for termination by cesarean section and the removal of the uterus, without which certain patients will bleed to death when delivered from below. This will occur because of the loss of the power of contraction and notwithstanding packing, ergot, and pituitrin. We have not, however, in this small series had to remove the uterus because of such a severe state of apoplexy. *Second*, the degree of toxemia, if any. It is easily appreciated that a very slight separation in a nontoxic patient might be treated expectantly, while the same amount of separation in a severely toxic patient would be treated entirely differently.

TABLE I. PLACENTA PREVIA

Cases of placenta previa	60
Primiparas	19
Multiparas	41
Average age of primiparas	29
Average age of multiparas	32
Placenta previa marginalis	45
Primiparas	14
Multiparas	31
Placenta previa lateralis	11
Primiparas	5
Multiparas	6
Placenta previa totalis	4
Primiparas	0
Multiparas	4

TABLE II. PLACENTA PREVIA. TREATMENT

Primiparas	19
Expectant	4
Artificial rupture of membranes	6
Insertion of bag	2
Braxton-Hicks version	0
Cesarean section	7
Low cervical	7
Classical	0
Blood transfusions	1
Multiparas	41
Expectant	3
Artificial rupture of membranes	9
Insertion of bag	18
Braxton-Hicks version	2
Cesarean section	9
Low cervical	4
Classical	5
Blood transfusions	4

TABLE III. PLACENTA PREVIA. RESULTS

Maternal deaths	2
Maternal mortality	3.3%
Total fetal deaths	20
(Including all babies dying in first two weeks)	
Fetal mortality	33.3%
Corrected fetal mortality	25.0%
(Excluding monsters and those below 7 months)	
Morbidity	21.6%

It will be noted in Table III that cesarean section was done in sixteen of the sixty cases of placenta previa, an incidence of 26.6 per cent. The cases terminated by this method were those of placenta previa totalis, and those with an uneffaced, rigid cervix with a living baby. At or near term the fetal mortality is reduced nearly 100 per cent when placenta previa is treated by cesarean section. Three of our section babies, however, were definitely premature and failed to survive. Because of the frequency of fetal monstrosities in placenta previa, which was first pointed out by Greenhill,^{4a} one must, in the interest of the baby,

make every reasonable effort to rule it out before an abdominal section. Five of the sixteen sections were classical operations, although we have almost given up the classical section; twelve classical operations were done in 1924, but none were done in 1932, 1933, or 1934. We do not feel that placenta previa is a contraindication to the low operation. This view is held by Daily,⁵ Greenhill⁶ and DeLee,⁷ while Siegel⁸ on the other hand, reports 101 cases in which only one low cervical was done.

It is our practice, if a woman is admitted in labor with the bleeding controlled by the presenting part, to treat her expectantly and with supportive measures, artificially rupturing the membranes if they are intact. Often one finds on first examination a cervix which will very shortly permit delivery. If spontaneous delivery does not occur it can be accomplished by forceps or version. Podalic version and extraction was done eleven times and seven women were delivered with forceps.

We restrict employment of a bag to control the bleeding, chiefly to the marginal type of placenta previa and rarely use it in a primipara. In only two primiparas were bags used. Both these babies were lost.

Braxton-Hicks version was done in two cases. These were both multiparas with a marginal type of placenta previa and in the one case the viability of the baby was questionable, while in the second case the baby was small and there were no fetal heart tones. We believe it should be restricted to cases of this character.

In all cases delivered from below the placenta is manually removed if there is continued bleeding. This was done in nine of the cases reported. Uterine and vaginal packing was used in ten cases. The cervix and vagina are routinely inspected for tears and while the records make note of several cervical tears, there were no deep ones through the placental site or into the broad ligament—a condition resulting most often from manual dilatation or delivery through an undilated cervix.

Blood transfusions were done in five of the cases reported. Fluids under the skin and by venoclysis have been used in nearly all the patients. Gum acacia solution in readiness for immediate use is always on hand in the maternity. It is of great value in combating shock and temporarily raising the blood pressure. I feel sure it aided materially in saving the lives of two of my patients, both of whom were admitted in a severe state of shock. The solution was given intravenously, while a bag was being put in and arrangements for transfusion made.

The maternal mortality of two in sixty cases (3.3 per cent) includes a multipara readmitted to the hospital with moderate bleeding and the cervix dilated. She was immediately delivered by version and extraction, packed and fluids given and, while a donor was in readiness, she died before blood could be given. The second case was a para ii, at term, who, after bleeding slightly for three hours with the membranes

ruptured, had a bag inserted which controlled the bleeding. Shortly following its expulsion she was delivered by version and extraction and the uterus packed. The packing failed to control the bleeding and the patient died a short time after delivery.

The fetal mortality of 25 per cent (including babies dead on admission) in the sixty cases reported compares favorably with other recent reports.

The morbidity in the series is 21.6 per cent following the standard set by the American College of Surgeons and the British Medical Association.

TABLE IV. PREMATURE SEPARATION

Cases of separation	35
Primiparas	15
Multiparas	20
Average age of primiparas	28
Average age of multiparas	31
Cases of toxemia	6
History of injury	1
Number of total separation	0
External bleeding occurred	35
Fetal heart tones absent on admission or disappeared before delivery	16

TABLE V. PREMATURE SEPARATION. TREATMENT AND RESULTS

Expectant	13
Artificial rupture of membranes	10
Insertion of bag	4
Cesarean section	8
Low cervical	4
Classical	4
Blood transfusions	4
Removal of uterus	0
Maternal deaths	1
Maternal mortality	3% (0.0268)
Total fetal mortality	62%
Corrected fetal mortality	26%
(This includes cases where no F.H.T. were heard on admission. It excludes babies below seven months and one anatomical anomaly)	
Morbidity	14.3%

While this series of premature separation is small, several things of interest are noted: First, the low incidence of toxemia, six out of thirty-five cases; and second, that external bleeding occurred in all patients; and last, there was one patient who had the complication with two successive pregnancies—both were interrupted by cesarean section and in neither was a live baby obtained.

Our diagnosis in the mild cases was based upon the hemorrhage, tenderness and rigidity, occasionally a sudden change in the character of the labor. In a few instances it was not definitely made until placenta previa had been ruled out by vaginal examination. The diagnosis, when the separation was more extensive, was made on the classical findings

of severe pain, marked rigidity of the uterus, fetal asphyxia, shock and increasing anemia. The outcome in any case rests upon the early recognition of the separation, its extent, the damage to the uterine musculature and the method used in treating it.

In the consideration of the treatment, I should like to point out that no uniform plan has been followed. For the most part the mild cases were treated expectantly and the severe cases by abdominal section. We have tried to keep in mind that it is not wise to be influenced too much by the baby's welfare, because of the very high fetal mortality. Bartholomew⁹ reports 83.5 per cent mortality, Davis and McGee¹⁰ 59.7 per cent, Polak¹¹ 87.5 per cent, and Wilson¹² 92.5 per cent.

Nearly one-half of the patients of our series were treated expectantly, many because there was only a mild separation in the course of labor and others because labor began with the onset of the symptoms of separation and progress was normal, without signs of increasing separation or fetal distress. With a change in the character of the pains, more bleeding and fetal asphyxia, more active treatment is begun. If the cervix is dilated and the head engaged, forceps delivery is done; if the head is unengaged, version is done. Nine of these patients were thus delivered: four by version and extraction and five by forceps.

Cesarean section was done eight times. It is restricted chiefly to patients not in labor and in whom there is much bleeding, shock and uterine damage. With proper supportive measures of blood transfusions, fluids by vein, morphia, etc., we believe cesarean section offers the best hope in the interest of the mother.

The third stage has been treated much in the manner as the treatment described for placenta previa; the placenta being manually removed for continued bleeding, and uterine and vaginal packing used in those cases where bleeding was not controlled or where there was doubt as to the ability of the uterus to remain contracted.

The one death in the thirty patients with abruptio placentae resulted from a ruptured aneurysm of the splenic artery with retroperitoneal and intraabdominal hemorrhage. This woman had been delivered a short time before by vaginal hysterotomy for premature detachment of the placenta.

SUMMARY

This study suggests that a fair percentage of the hemorrhages in late pregnancy may be treated expectantly with success.

An early diagnosis, the combating of shock and anemia by fluids and blood transfusions together with immediate treatment is essential for good results.

While cesarean section is the best treatment in selected cases, it should not be advocated as routine treatment. The low cervical cesarean section is not contraindicated in either placenta previa or premature separation.

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SOME PROBLEMS IN PREGNANCY AND DIABETES*

AN ANALYSIS OF 20 PREGNANCIES IN 17 PATIENTS AND A PRELIMINARY
REPORT ON 238 COLLECTED CASES IN THE LITERATURE

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THE problems involved in diabetes and pregnancy have been frequently discussed in the literature. Since the advent of insulin, there is a prevailing opinion that the dangers arising in a pregnant diabetic individual may be minimized. Some intimate that diabetes mellitus should not be considered a contraindication to pregnancy. This again raises the question, shall we or shall we not advise a diabetic individual to undertake the responsibility of having a child? It is with this object that the author presents some of the aspects of diabetes and pregnancy, reports a study of the results of twenty pregnancies in seventeen patients and also an analysis of 238 collected cases from the literature. A survey on a larger scale will be published later.

The difficulties presented in a diabetic patient with pregnancy may be explained by a combination of circumstances working against the patient. We have to consider the disturbances that pregnancy may exert upon the diabetes, and, on the other hand, the influences of the diabetes upon the mother and child.

EFFECTS OF PREGNANCY UPON DIABETES

Before discussing this, a word or two about the minor derangements of the carbohydrate metabolism in the pregnant nondiabetic patient. Here the presence of sugar in the urine is not unusual. It may be transient or the glycosuria may persist. A vast majority of these patients have a normal blood sugar. As a rule the glycosuria disappears

*Read, by invitation, at a meeting of the Obstetrical Society of Philadelphia, Nov. 1, 1934.

with the termination of the pregnancy. However, occasionally one meets with cases in which diabetes mellitus develops during the period of gestation.

Joslin¹ emphasizes the significance of glycosuria in pregnancy and the possibility of diabetes developing at this time. He recorded thirty-three such cases out of fifty-eight diabetics. These figures are rather high as diabetes complicating pregnancy is a rare occurrence. First,² in an examination of 1,000 consecutive records at the Jewish Maternity Hospital in Philadelphia, found only one case of diabetes developing during pregnancy. Hirst,³ in a survey of 5,000 pregnancies at the Preston Retreat in Philadelphia, reported only one case.

INFLUENCES OF PREGNANCY UPON ONE WHO IS ALREADY DIABETIC

Here the opinion is decidedly divided. Some are convinced that the diabetic condition may improve. On the other hand, while it is true that there may be an improvement of the tolerance during certain months of the pregnancy, there may be a decided lowered tolerance for starches necessitating increased insulin dosage, in other stages of gestation. This dissimilarity of views likewise exists in the period after pregnancy.

The improvement of the diabetes is attributed by many to the added secretion from the fetal pancreas. In favor of this argument are the works of Carlson⁴ and others who noticed hyperplastic changes of the islands of Langerhans, both in animals as well as in the human fetal pancreas. Against this view is the fact that this does not exist in all cases. Ambard⁵ and Morrison⁶ have found fibrotic changes in the pancreas in some cases, and there are occasional reports of a newborn child dying from diabetes. If the presence of fetal insulin were so essential to the mother, would we not expect to increase the dose of insulin to supplement for the lack of the fetal secretion after delivery? This is not borne out clinically. If anything, the mother must be carefully watched, and it may be necessary to diminish promptly the insulin dosage in order to avoid severe hypoglycemic reactions.

It is quite possible that the explanation for any improvement may be the result of closer observation and better cooperation on the part of the patient, particularly when insulin is administered. The possibility of the fetus utilizing some of the available carbohydrates may also be mentioned.

The behavior of the diabetes during pregnancy is shown in Table I. Of the 110 available records, 52 showed improvement, 32 were worse, and 26 were unchanged.

The future course of the diabetic condition cannot be definitely evaluated. In some cases which were observed, a mild form of diabetes, easily controlled by diet, subsequently required insulin. On the other hand, in some severe cases the diabetic condition may be unaltered, even after trying experiences during the pregnancy and labor. However, one can-

not attribute the progress of the disease to the pregnancy. It may be due to neglect or failure to adhere to the diet.

Coma may come on suddenly with little warning. It was encountered in two of our series of twenty pregnancies (10 per cent). There were eleven cases reported in the collected series.

TABLE I. STATISTICS OF 238 PREGNANCIES

	AUTHOR		SKIPPER		COLLECTED		TOTAL	
	CASES	%	CASES	%	CASES	%	CASES	%
Improved	5	25	4	10	43	24	52	21
Worse	9	45	11	29	12	6	32	13
Same	3	15	10	27	13	7	26	11
Not mentioned	3		12		113		128	
No. cases reported	20		37		181		238	

Acidosis is probably far more common than is generally supposed. It may exist with few or no symptoms and may explain some of the cases of coma that are precipitated with no apparent cause. An illustration of this fact may be gleaned from a record of a young severe diabetic who suddenly developed coma in the eighth month of her pregnancy. Two years later, while in the hospital for routine study during her second pregnancy, a severe acidosis was discovered with the CO_2 as low as 28. There were absolutely no symptoms nor was there any discomfort. The acidosis was vigorously treated and the CO_2 raised to 42. She subsequently was delivered of a live child.

Effects of diabetes upon the pregnancy may be manifested in the mother and in the child. Complications may appear in the form of miscarriages, abortions, therapeutic abortions, the necessity for induction of labor before term and hydramnios. Manifestations in the child will be discussed separately.

Miscarriage or abortions may result from the acidosis or may be due to some change, not clearly understood, in the reproductive organs that often exists in the diabetic patient. This statement is based on the well-known fact that there may be menstrual disturbances in the young diabetic and sterility is not at all uncommon.

There were five abortions, including two therapeutic abortions, out of twenty pregnancies (25 per cent) in our series. Skipper⁷ reported twelve abortions, two of which were therapeutic, in a series of thirty-seven pregnancies (32 per cent), while Joslin mentioned thirteen in his series of eighty-nine pregnancies (14 per cent). *Induction of labor* may be necessary in the later months of pregnancy if the diabetic acidosis becomes extreme or if there is coma which cannot be controlled by insulin. This procedure may be necessary to save the life of the mother.

Induction may also be performed in an attempt to deliver a live child, especially if there is a history of a stillborn child in previous pregnancies.

Hydramnios: Regardless of the nature of this fluid, whether it be a secretion of the amniotic membrane or a urinary excretion from the fetus, it is an accepted fact that an excessive amount of amniotic fluid is not infrequent in diabetics. Skipper found an incidence of 27 per cent, but since the use of insulin, these figures have been reduced to 11 per cent.

Hypoglycemic Reactions: Hypoglycemic shock should also be kept in mind as this may endanger both the life of the mother and the child. Some feel that occasionally it may be responsible for fetal death. It also may jeopardize the life of the mother, particularly when there is danger of the condition's being unrecognized and mistaken for diabetic coma and treated accordingly. The added insulin may prove fatal.

Effect Upon Delivery.—Although various possibilities have been mentioned above whereby labor may be precipitated and pregnancy disturbed, we may say that in patients who have been carried along successfully to term by skillful management, the delivery need not be any more complicated than one may expect in nondiabetic patients. The danger of infection is not necessarily increased. The only possible difference may be a somewhat prolonged labor due to an overweight child.

Effect of diabetes upon the child is more or less interwoven with the effects upon the mother. Fetal mortality should embrace miscarriages, abortions, therapeutic abortions, and stillbirths, and some insist that deaths occurring within one to three days after delivery should be included. The high death rate is due to various causes, most important of which are acidosis and coma, hypoglycemic reactions, an overweight fetus, possible changes in the reproductive organs which may account for some of the miscarriages early in the pregnancy, and occasionally to diabetes itself.

Statistics show that the death rate of the child ranges from 37 to 65 per cent, the collective figures showing an average of 43 per cent. The largest group comes under the heading of stillbirths, which deserves some comment.

Stillbirths: The incidence of stillbirths in diabetics varies. In our records there were sixty stillbirths out of 238 pregnancies (25 per cent). The exact cause of death is not clear. Acidosis is the most likely explanation. However, there may be other contributory factors, either toxic, metabolic, or endocrine. It is presumed that carelessness upon the part of the patient and failure to carry out the diet rigidly are responsible for this unfortunate condition. In some cases, stillbirths occur despite the cooperation of the patient and skillful medical care.

The fetus evidently dies late in the course of the pregnancy. Fetal heart sounds may be heard until the second or third week prior to the expected time of birth. *Hypoglycemic shock* in the newborn must be kept in mind. The hyperplasia of the islands of Langerhans seen in

some cases may be instrumental in producing hypoglycemic reactions after birth, unless the child is given carbohydrates. This may explain some of the deaths occurring shortly after delivery.

Overdevelopment: An overweight child is frequently found in diabetes. This is so prevalent that even in nondiabetics the birth of an overgrown child suggests an investigation of the carbohydrate metabolism of the mother. This overdevelopment of the fetus is most likely due to the hyperglycemia of the mother. It is also possible that the normal pituitary function may be influenced in some way, thereby bringing about an increased skeletal development. The significance of an overweight child is obvious. It makes labor more difficult and prolonged, thereby increasing the liability to trauma during birth.

Congenital Diabetes: A hereditary tendency to diabetes is said to occur in from 16 to 35 per cent of the children. One may assume that this influence would be noticeable in the newborn child. Fortunately, this does not exist, as only two or three cases have been reported in which diabetes was discovered at birth or a few days after delivery. White⁸ found only one case in 150 pregnancies of diabetic women in which the child developed diabetes at the age of five years.

Prognosis.—We will confine ourselves to the mortality statistics pertaining to mother and child.

In the author's series of twenty pregnancies, there were no deaths during pregnancy; two died within a year after birth. In a collected group of 238 pregnancies gathered from the literature, there were eight maternal deaths during pregnancy and the puerperium, seven died within one year and nineteen more up to three years, giving a total mortality rate of 14.2 per cent. This is practically in accord with Skipper's figures of 12.7 per cent in a collected series of 118 cases. A comparison of these figures based on the rate per 1,000 total births, with statistics^{9, 10, 11} in nondiabetics is arranged in Table II. The significance of these figures is obvious. Comparing the diabetic mortality with the general puerperal death rate, the liability was about six times greater when we consider only the group of diabetic deaths occurring during

TABLE II. SHOWING MATERNAL DEATHS IN 238 PREGNANCIES COMPARED WITH AVERAGE PUERPERAL DEATH RATE IN PHILADELPHIA AND PENNSYLVANIA FROM 1929 TO 1933 (INCLUSIVE) AND THE CONTINENTAL UNITED STATES

	DIABETIC			PHILADELPHIA RATE PER 1,000	NONDIABETIC PENNSYLVANIA TOTAL BIRTHS	CON- TINENTAL UNITED STATES
	DEATHS	%	RATE PER 1,000			
During pregnancy	8	3.3	33	{ 5.1 (5 yr.) 6.39 (10 yr.)	5.7	6.46
Up to 1 year	7	2.9	29	----	--	---
1 to 3 years	19	7.9	79	----	--	---

pregnancy and the puerperium. The liability is even greater when we consider the total number of deaths up to the three-year period. The causes of death are usually diabetic coma or heart failure.

Fetal Mortality: There were 114 live births out of 238 pregnancies (47 per cent), equivalent to 470 in 1,000 total births. Compare these figures with the average of 95.7 per cent in Philadelphia and somewhat less than the 96 per cent in Pennsylvania (Table III). In the diabetic

TABLE III. SHOWING THE NUMBER OF LIVE BIRTHS AND STILLBORN IN DIABETICS COMPARED WITH THE AVERAGE LIVING BIRTHS AND STILLBORN IN PHILADELPHIA AND PENNSYLVANIA FROM 1929 TO 1933 (INCLUSIVE)

	DIABETIC		NONDIABETIC	
	NO.	PER CENT	PHILADELPHIA AVERAGE FROM 1929 TO 1933 INCL. PER CENT	PENNSYLVANIA PER CENT
Survived	114	47.0	95.7	96
Stillborn	51	21.0	4.2	4
Died within 3 days	14	5.8	---	--

group, one out of every five pregnancies may be a stillbirth, whereas only one in twenty-five occurs in nondiabetics. The diabetic liability is evidently five times greater than the ordinary pregnancy.

Management of Diabetes and Pregnancy.—The patient should be impressed with the necessity of cooperating faithfully, adhering to the diet and general care.

Frequent observations with routine urine and blood examinations should be made. Hyperglycemia should always be controlled.

The diet should be ample for the mother's needs, but it is important to avoid overweight, having in mind the tendency to bear an overdeveloped fetus.

In later months, hospitalization is advisable, even if only for two or three days, so as to make thorough studies for acidosis and to standardize insulin dosage. Acidosis may exist without apparent signs or symptoms.

Coma may be precipitated without warning. It should be treated vigorously with insulin and, if there is no prompt response, the advisability of emptying the uterus should be considered.

Induction of labor may be necessary in the late months of pregnancy if diabetic coma appears and is resistant to treatment. Labor may be induced before term in an attempt to deliver a live child when there is a history of previous stillbirths.

Method of Delivery: If the patient's condition is satisfactory, the natural delivery is preferable. There is no contraindication to a brief gas anesthesia if desired. Cesarean section has been advocated by some as the method of choice because it is a rapid means of delivery. It certainly is preferred when the patient requires assistance during labor. Spinal or gas anesthesia is far safer than ether or chloroform which have a tendency to induce or aggravate acidosis.

If laparotomy must be performed, the question of bringing about sterility should be kept in mind. This subject has been discussed by some writers in recent literature.

Management of Postparturient Period: Careful observation of insulin dosage and the blood sugar must be carried out. Hypoglycemic shock and coma are always possible developments and sometimes it is difficult, off hand, to differentiate between the two without proper blood studies.

When *lactation sets in, the blood sugar may drop and the dose of insulin must be diminished promptly.* This may be a temporary change. Later, the full dose of insulin may again be necessary.

Should the diabetic mother nurse her child? I do not see any objection to this, nor is there any danger if the mother's condition permits. However, I do think it will be to her advantage if the responsibility of breast feeding can be obviated.

The child should be carefully watched, especially for the first few days after birth, for the possibility of hypoglycemic shock.

SUMMARY AND CONCLUSIONS

The influence of pregnancy upon diabetes varies. There may be improvement at some period of gestation. Some attribute the increased tolerance to the added insulin secretion from the fetus. However, this explanation is more conjecture than one based upon scientific or clinical facts.

Acidosis may exist in the later months of pregnancy without symptoms or signs.

Coma is relatively infrequent but may develop suddenly in the late months of pregnancy.

Diabetes may influence the course of pregnancy by causing miscarriages, or abortions, necessitating therapeutic abortions or making induction of labor advisable before term to save the mother or the child.

Hydramnios is, relatively, a frequent occurrence in diabetes, ranging from a former percentage of 27 to 11 since the use of insulin.

The maternal death rate in diabetics is comparatively high. There were eight deaths during pregnancy and the puerperal period in 238 pregnancies. The equivalent rate per 1,000 total births would be 33.6 compared with the 5.7 in Pennsylvania and 6.46 in the Continental United States. If the rate included those who died within one to three years after birth, the figures would be comparatively higher, 79 per 1,000 births.

Fetal Statistics: There were 114 live births in 238 pregnancies (47 per cent) compared to 96 per cent live births in Pennsylvania in nondiabetics. Stillbirths are frequent occurrences in diabetics. There were fifty-one in the series of 238 pregnancies, or 21 per cent, compared to 4.2 per cent in Philadelphia statistics for nondiabetics.

The question as to *how we are to advise diabetics who desire children* cannot be answered without taking into consideration the condition of the patient and her ability to cooperate fully with the physician. The patient and family should be informed of the added risks, the likelihood of complications during pregnancy, plus the diminished chances of having a live child. However, there is always the possibility of going successfully to term if she is careful with her diet and if adequate insulin is administered. Treatment must be instituted early and maintained throughout the pregnancy.

The outlook for a mild or even moderately severe diabetic patient is fairly good provided the patient observes the rules. With the severe diabetic, the margin of safety is too narrow. Although these patients may go through the period of gestation without mishap, there is the constant danger of acidosis, and coma is always a menace.

In conclusion, the successful termination of pregnancy in a diabetic patient will depend upon the severity of the disease, frequent periodic examinations throughout the period of gestation, faithful adherence to the diabetic regime, and the skillful management of the case both by the obstetrician and the internist.

The author wishes to express his grateful acknowledgment to Drs. P. B. Bland, P. Williams, and J. Walker for their courtesies and privileges in observing patients on their services.

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Steinert, J., and Papp, G.: Maternal Milk and Menstruation, Ztschr. f. Kinderh. **56**: 208, 1934.

The investigations of Steinert and Papp in 30 nursing women revealed that the diastase content of their milk diminishes during menstruation. This decrease was greatest in women who had pronounced symptoms, notably headaches and anorexia, and whose nursing infants were markedly restless. The authors could not detect either hypophyseal or ovarian hormones in the milk.

J. P. GREENHILL.

CANCER OF THE UTERUS IN CHILDHOOD

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CANCER in the early age groups is generally considered to be quite rare and, from a statistical point of view, this is true. Many of the signs and symptoms, which, if they occurred in an older person would arouse the suspicion of malignancy and lead to proper confirmatory or eliminatory diagnostic procedures, are explained by us as due to more common pathologic and functional entities.

Of the various childhood neoplasms, with the exception of those very obvious malignancies of the skin and the lymphangiomatous or hemangiomatous groups, those of the osseous system are probably less often missed. Giant cell tumors, intracranial neoplasms, as well as the bone sarcomas, by their early objective manifestations, are comparatively easy to diagnose. The hypernephroma, or as some prefer to call a probably closely related tumor now, the renal adenocarcinoma, with the symptoms of hematuria, and rapidly developing abdominal tumor, are not so long overlooked.

In this paper we are confining our remarks chiefly to neoplasms of the female genital tract, and particularly to the uterus.

D. H., was referred on June 19, 1933, at the age of two years and three months, with a complaint of vaginal bleeding and irritating vaginal discharge. She was first seen by a doctor on May 3, 1932, when fourteen months of age, and had had vaginal bleeding for two days. Smear at that time was negative, and she was put on argyrol instillations. When seen again on June 14, 1932, the bleeding had completely ceased, and a moderate discharge was present, which was again present on subsequent visits. Smears again were negative, and cleansing irrigations and instillations were advised. The mother then reported a recurrence of the vaginal bleeding on June 19, 1933. She was referred to us at that time.

The discharge had become foul in June, 1932, and remained so, increasing and decreasing throughout the twelve months. On June 18, there had been passage of bright red blood, with clots, from the vagina.

Family history was negative: three sisters and one brother all alive and well; no tuberculosis, syphilis, diabetes, malignancy, hemophilia, or other unusual tendencies in the family history.

Birth and development were normal until onset of present illness.

The child was well nourished and well developed. Genitalia externally were reddened, with some hypertrophy of clitoris and labia majora; no adhesions. Urethra normal and hymen intact.

Probing of the vagina revealed no palpable foreign body, or undue resistance. Speculum examination in office not satisfactory. Rectal examination showed a rounded body, about the size of a small hen's egg, which gave the impression of being an enlarged uterus.

Smears were negative for gram-negative intra- or extracellular diplococci. A tentative diagnosis was made of either endometritis, endocervicitis (nonspecific), or perimetritis. Possibility of precocious menstruation. Warm boric acid douches were given, alternating with zinc sulphate and tannic acid.

She was next seen on July 1, 1933, discharge the same, with an exacerbation of the bleeding. Sleep good; bowels and bladder negative. No urinary disturbances.

On July 6, 1933, under ether anesthesia a bimanual rectoabdominal examination was done. The same sort of mass was outlined as before, but with more distinction; it seemed to be about apricot-sized, and involved the left half of the corpus and cervix uteri; was loosely attached anteriorly in the direction of the left horizontal pubic ramus; not fluctuant; but firm and fibrous. During, and after the examination, a few clots of dark blood escaped from the vagina.

A left mediolateral episiotomy, hymenotomy, and digital examination done: the mass seemed to be a part of the cervix, and invading the left fornix. Biopsy was taken from the anterior cervical lip, and also from a pedunculated mass of fibrous tissue in the left vaginal fornix.

Patient made good recovery from the operation and returned home.

Pathologic Report.—"Carcinoma," or, possibly, a "carcinosarcoma." After discussing the case with the parents, and roentgenologist, it was decided to give the

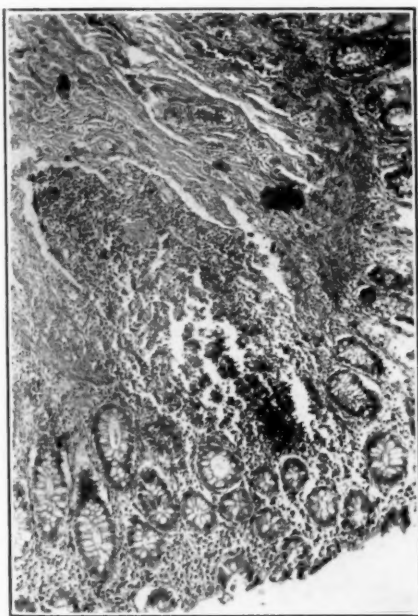


Fig. 1.

Fig. 1.—Shows a low power magnification of the infantile endometrium, with infiltration of carcinoma cells between the acini and down growth into the myometrium.

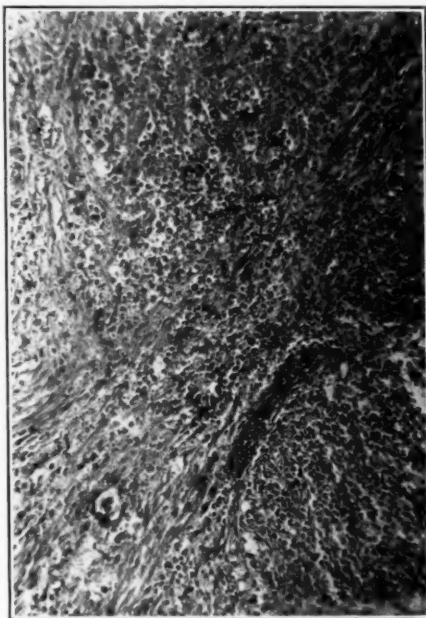


Fig. 2.

Fig. 2.—A low power view, showing widespread infiltration of the cancer cells into the myometrium; practically no acinar arrangement seen; many mitotic figures.

child a course of deep x-ray therapy, and if possible, extirpation of the mass might be considered later.

Between July 11, 1933, and Aug. 30, 1933, she was given a total irradiation of 1,100 roentgens, divided in six doses, three to the ventral part and three to the dorsal.

The patient was next seen on Sept. 23, 1933; she had been feeling good prior to this time, gaining weight. Recently she had been crying at night, and bleeding recurred on Sept. 22, 1933, passing about one ounce of bright blood from the vagina. Rectal examination revealed a definite decrease in size of the mass, which was now estimated at two-thirds of the original size, but still stony hard. It was

slightly more movable than on the previous examinations. The appetite was good; weight unchanged. Temperature 99.9°, axillary. She was given camphorated tincture of opium for pain.

On Oct. 21, 1933, urinary symptoms developed, with dysuria, retention, difficulty in starting stream, and passage of very small amounts frequently. Catheterization revealed a residual of 300 c.c. of dark, concentrated, cloudy urine (Sp. gr. 1.042). The child was passing quantities of blood each day, both from the vagina, and in the urine, and daily catheterization was done, with residual urine from 150 to 300 c.c. each time. One per cent mercurochrome was instilled into the bladder after washing it out with boric acid and normal saline solution.

From then on the course was rapidly downhill, with loss of weight and appetite, progressive anemia, and finally death on Nov. 3, 1933.

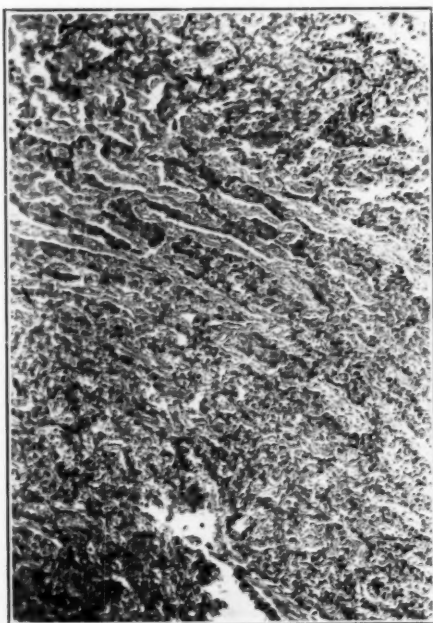


Fig. 3.

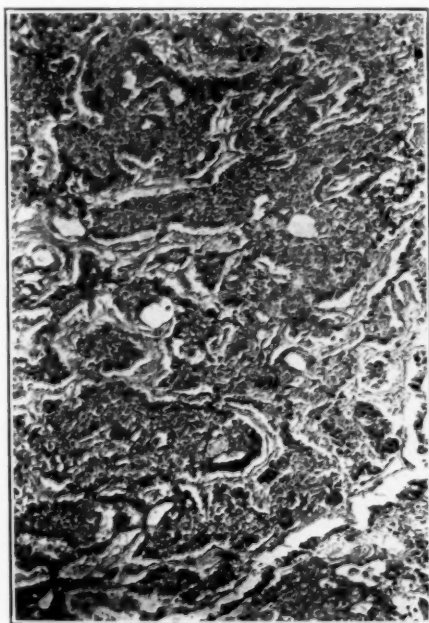


Fig. 4.

Fig. 3.—Low power showing invasion of malignant cells into muscle structure with little stroma and considerable attempts at glandular formation.

Fig. 4.—Section from papillary growth on the posterior wall of the urinary bladder.

Necropsy Report.—Liver was light colored, but no other evident changes; kidneys large, light colored, and showed moderate fetal lobulations. Marked cloudy swelling and moderate hydronephrosis. No evident changes in the spleen, pancreas, adrenals, and intestines. A few small tumor-like nodules in the lower part of the mesentery.

Urinary bladder: wall 4 to 6 mm. thick. There was a soft tumor mass on the anterior surface of the posterior wall, immediately above the trigone. This was 3.5 by 2.5 by 2 cm. thick. The tumor was spongy.

The uterus was 7 cm. long, 5 cm. broad; the wall was 2 cm. thick, and the cavity of the uterus was filled with black purulent fluid. There was considerable diffuse scarring and tumor growth in the wall.

Microscopic sections of the wall of the uterus showed the inner portion to consist of irregular masses of glandular epithelial cells. There was considerable diffuse

scarring of the wall of the uterus. Many of the epithelial cells of the mucosa were degenerated and necrotic. Very few were free from degeneration. The tumor cells of the bladder consisted of glandular epithelial cells occurring in tubules, and in papillary arrangement. There were a few mitotic figures in these cells. The small nodules in the mesentery consisted of lymph nodes containing small masses of glandular epithelial cells.

There was marked cloudy swelling and hydronephrosis of the kidneys. There were many small hemorrhages, and many round cells and leucocytes in the pelvic portion of the kidneys. The liver showed a moderate amount of fatty changes, and many round cells in the portal spaces.

Anatomic Diagnosis.—Carcinoma of the uterus, with extension to adjacent structures, and metastasis to mesentery, hypogastric, iliac, and inguinal nodes; acute and chronic cystitis; acute nephritis and hydronephrosis; fatty changes, and cloudy swelling of the liver.

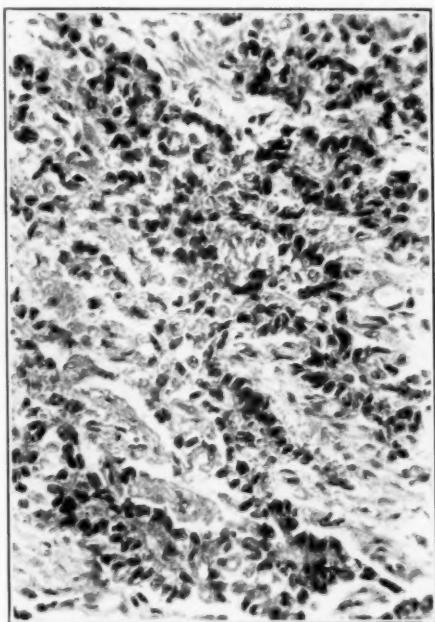


Fig. 5.

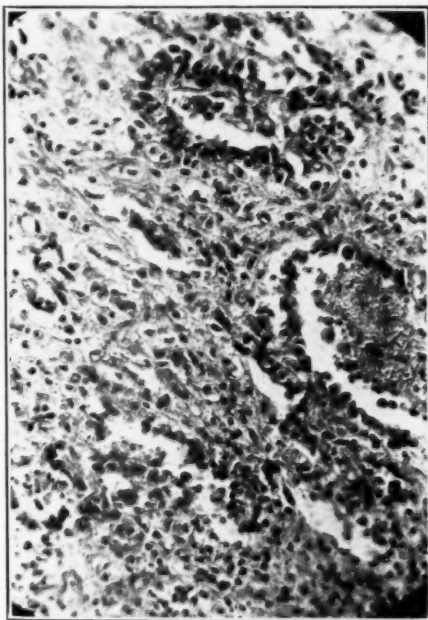


Fig. 6.

Figs. 5 and 6.—Oil immersion magnification of the malignant tissue in the uterine walls, showing many mitotic figures, much degeneration and necrosis seen.

During the last three weeks of life the mass became palpable abdominally, and extended about two fingerbreadths above the symphysis, and to the left of the mid-line. The weight loss was progressive, and the last weight, about one week before death, was 21½ pounds.

Dr. James Ewing of New York examined the sections and gives the following opinion: "an adenocarcinoma, papillary type, but with considerable infiltration of the wall of the uterus. The tumor has been rather bulky, and much of it is necrotic, but the outer portions are well preserved. The structure does not differ greatly from some endometrial carcinomas of adults. It is not distinctly embryonal, and therefore, I think it probably arose from the once normal infantile endometrium. It is, of course, quite malignant, but not more so than any of the adult adenocarcinomas of the uterus."

In the twelve cases of carcinoma of the uterus reported in the literature, besides the one of our own, as well as the other neoplasms of the uterus, one is struck by the frequent early fatal outcome. Usually the malignancy is inoperable when first seen, and nowhere near approaches the 50 per cent operability of all uterine carcinoma (cervical and corporal), such as was found in the carcinoma seen recently at the Mayo Clinic as reported by Mahle, and in some of the Berlin clinics, as noted by Semmelweis.

The best results can be obtained, as in adults, by early diagnosis, careful investigation of suspicious cases, and the use of preliminary irradiation therapy, followed by appropriate surgery if possible. In the few cases where it is seen early, and localized to the cervix, radium, or even deep x-ray, may effect a complete cure, and this should be attempted prior to surgical attack.

MERCUROCHROME TO SECURE VAGINAL ANTISEPSIS DURING LABOR

A REPORT OF SIX THOUSAND CASES

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THE report of the Committee on Maternal Mortality in the City of New York has renewed the interest of the profession in the cause and prevention of puerperal deaths. According to that report, a large number of the deaths were charged to the physician, and of these, at least 40 per cent were ascribed to puerperal sepsis. If we would lower the mortality rate from childbirth, let us begin by reducing the number of deaths from infection. We can control deaths from toxemia and prevent deaths from postpartum hemorrhage in the majority of cases, providing the mother has had adequate prenatal care and proper precautions are taken. It is my belief that it is by the adoption of vaginal antiseptics that further progress must be made.

CHOICE OF ANTISEPTICS

The ideal antiseptic to use for the disinfection of the birth canal should be powerful enough to destroy or inhibit the multiplication of the vaginal flora, noninjurious to the mucous membrane, and should not retard the healing of the lacerated tissue by any destructive action on the submucous structures. It should mix easily with blood and mucus and still retain its antiseptic qualities after dilution or concentration (by drying). Its repeated application should not cause discomfort to the patient, or reaction in the vaginal mucosa or skin of the perineum.

We have used a 4 per cent solution of mercurochrome for ten years and, although there may be some objection because of its staining

qualities, we feel that it has proved entirely satisfactory. We have had no reactions which have been injurious either to mother or child, and we are convinced that when the instillation is done before the cervix is fully dilated, and at least one hour before delivery, the vaginal flora is destroyed to such an extent that serious puerperal infection is almost impossible. The presence of the mercurochrome not only protects the patient from the bacteria already in the vagina, but also prevents infection from being introduced from other sources, during labor and delivery.

BACTERIOLOGY OF THE VAGINA

Much has been written on this subject during the last few years and only recently Douglas and Rhees¹ have reported on intrauterine cultures taken during the postpartum period. A large number of organisms were found; 73.6 per cent were anaerobic streptococci, of which 8.1 per cent were facultative aerobes that might have played a rôle which would have caused a morbidity, or even a mortality, had not the protecting mechanisms of the mother been sufficient to withstand the invasion of the maternal tissues. Experience proves that these powers of resistance are not always present.

Technic.—The mercurochrome technic as we have used it at the Methodist Episcopal Hospital since Jan. 1, 1928, has been previously outlined in detail.² In brief, a 4 per cent aqueous mercurochrome solution is used to spray the perineum, except at the time of delivery, when a 4 per cent aqueous acetone solution is used. On admission of the patient, three drams of a 4 per cent aqueous solution of mercurochrome are instilled in the vagina by means of a special Asepto Vaginal Syringe, and this is repeated every twelve hours during labor.

The perineum and surrounding area can be prepared by any of several methods. The use of plenty of green soap and water should be satisfactory, and would undoubtedly destroy the majority of the bacteria. Iodine may be used, but it is irritating and its repetition may lead to a serious skin reaction which has proved troublesome and may itself be a source of infection. The repeated application of a 4 per cent solution of mercurochrome aids in keeping down the number of bacteria on the perineum and discourages infection from without. But this is not enough. *No matter how strong the antiseptic or how thorough the perineal preparation, some antiseptic must be instilled into the vagina in order that the preparation may be adequate and the entire responsibility of the doctor fulfilled.*

A few obstetricians report that they have used mercurochrome and have had no better results than without vaginal instillation. Success with the mercurochrome technic demands that it be properly carried out. *One instillation, even though an ounce of solution be used, is not sufficient if done immediately before delivery, rupturing membranes, or any operative interference.* It must be done at least one hour before any procedure is undertaken. The labia must be held firmly about the syringe in order that the solution may enter the vagina under some pressure.

An analysis of the morbidity of 6,285 cases delivered since Aug. 1, 1930, shows a gross morbidity, omitting the cesarean sections, of 5.5 per cent.

TABLE I. MORBIDITY REPORT FROM AUG. 1, 1930, TO JAN. 1, 1934

	CASES	MORBID- ITY	PER CENT MORBID- ITY	MORTALITY	
				TOTAL	VIABLE VAGINAL DELIV- ERIES
Deliveries	6,285	474	7.5	13	
Cesarean sections	230	139	60.4	6	
Deliveries less cesarean sections	6,055	335	5.5	7	4
Ward	3,618	225	6.2	5	3
Private	2,437	110	4.5	2	1
Primiparas	2,968	198	6.6	1	
Multiparas	3,087	137	4.4	6	4
Spontaneous	3,418	166	4.8	2	2
Operative	2,637	169	6.4	5	2
Low and prophylactic forceps	2,118	119	5.1	1	1
Medium forceps	351	33	9.4		
High forceps	28	1	10.7		
Versions	48	5	10.4	1	1
Inductions	92	11	11.9	3	
Breech	310	16	5.1	1	1
Scanzoni	61	5	8.1		
Left occiput anterior	2,878	155	5.3	3	2
Right occiput anterior	1,470	85	5.7	1	1
Left occiput posterior	464	43	9.2		
Right occiput posterior	575	41	7.1	1	1
Lateral episiotomy	3,059	195	6.3	1	1
Median episiotomy	458	17	3.7		
Postpartum hemorrhage	145	34	23.4	3	2
Premature separation of placenta and accidental hemorrhage	82	17	20.7	1	
Anemia	54	20	37.03		
Placenta previa	56	17	30.3		
Eclampsia	28	6	21.4		
Toxemia	558	59	10.5	2	1

TABLE II. ETIOLOGY OF MORBIDITY FOR THE YEARS 1930-1934

Total deliveries less cesarean section		6,055	
Morbidity		335 or 5.5%	
Corrected morbidity		172 or 2.8%	
<i>Due to Delivery</i>			
Lochiorrhoea	60	Reaction	6
Puerperal infection	8	Unclassified	24
Sapremia	34	No note	2
Endometritis	17	Examination negative	5
Parametritis	5	<i>Not Due to Delivery</i>	
Salpingitis	1	Respiratory	24
Phlebitis	1	Breasts	66
Retained membranes	3	Pyelitis	68
Retained placenta	1	Tuberculosis	2
Infected perineum	5	Cystitis	3

Ninety-four cases had a morbidity of two or three days and have been classified as being due to either lochiorrhoea or sapremia. Whether this is correct, or whether these patients had a low-grade intrauterine infection which should have been classified as puerperal infection, is difficult to determine.

The corrected morbidity for the series was 2.8 per cent. In determining the corrected morbidity 163 cases were omitted, and of these respiratory, breast, and kidney infections accounted for 158. Some of these temperatures may have been due to other causes, but it is also true that many cases classified as due to delivery may belong to this group.

TABLE III. MATERNAL DEATHS, 1930-1934

Total deliveries	6,285
Total deaths	13
Cesarean sections	230
Cesarean section deaths	6
Deliveries less cesarean sections	6,055
Deaths less cesarean sections	7
Viable vaginal deliveries	4
Died undelivered or delivered before admission	1
Premature deaths	
From 3 to 7 months	2
Under 3 months	0
Died within 24 hours	2

A morbidity of short duration undoubtedly has little effect on the future well-being and convalescence of the mother, but when it is prolonged it is likely to cause damage which may lead to trouble in later years.

Of the six patients in this group, with morbid symptoms lasting twenty days or more, two were primiparas, one had a vaginal examination and her morbidity was due to a breast abscess. Only three patients were given an instillation during labor; one had a breast abscess, one a pyelitis, and the third had a temperature before delivery. Two of the six cases were operative and the morbidity was easily accounted for by conditions not due to delivery.

MATERNAL DEATHS

The death rate was 2.06 per one thousand deliveries while for the viable vaginal deliveries, it was a little over one per thousand. There were almost as many deaths from cesarean section as there were among the viable vaginal deliveries, and still the death rate was only 2.6 per cent.

TABLE IV. CAUSE OF DEATH

<i>Viable Vaginal Deliveries:</i>	7	<i>Cesarean Section Deaths:</i>	6
Breast abscess	1	Eclampsia	1
Cardiac case	1	Embolism	1
Necrosis of liver	1	Intestinal obstruction	1
Postpartum hemorrhage	1	Sepsis	1
Ruptured uterus	2	Toxemia	2
Toxemia	1		
<i>Delivered Before Admission and Not Delivered:</i>			1
Toxemia			1
<i>Between Three and Seven Months:</i>			2
Hyperemesis gravidarum			1
Ruptured uterus			1

There were no mothers lost from puerperal sepsis in this series of 6,055 viable vaginal deliveries, and if we were to include all such cases delivered since Jan. 1, 1928, there has been but one death in over 13,000 cases. This does not include a mother who died from embolism following an operation for breast abscess, nor does it include two women who had a normal temperature for two weeks, were discharged from the hospital, were later readmitted, and died from infection.

SUMMARY

The present mercurochrome technic at the Methodist Episcopal Hospital of Brooklyn, N. Y., was established Jan. 1, 1928, and since that time 11,564 patients have been delivered with a gross morbidity of

7.2 per cent and with 35 maternal deaths. Four hundred eight of these were cesarean sections, with a morbidity of 53 per cent and 11 deaths. There were 11,157 vaginal deliveries with a morbidity of 5.5 per cent, a corrected morbidity of 2.7 per cent, with 24 maternal deaths, in 11 of which cases the child was viable. During the experimental stages 5,253 patients were delivered, making a grand total of 16,817.

If we omit the cesarean sections, the following may be gleaned from the tables:

1. The ward morbidity was 6.2 per cent with 5 maternal deaths while among the private patients the morbidity was 4.5 per cent with 2 maternal deaths.

2. There was 2.2 per cent more morbidity among the primiparas than the multiparas, but 6 times as many deaths among the multiparas.

3. The morbidity of the operative cases was 1.6 per cent more than the spontaneous. If we consider only the viable vaginal deliveries, there was one death in 1,700 among the spontaneous while with the operative there was one in 1,300.

4. In the last 6,000 cases only one patient in 1,000 had a morbidity lasting twenty days. Of the six with a prolonged morbidity only three were given an instillation during labor, one of which had a breast abscess, one a pyelitis, and the other a temperature before delivery.

5. Lochiametra was given as the cause of morbidity in 60 cases and sapremia accounted for 34. In the causes of morbidity not due to delivery, respiratory conditions accounted for 24, mastitis 66, and pyelitis 68.

6. There have been 13,525 deliveries since the establishment of the present technic with 39 deaths, six or 15 per cent were due to puerperal sepsis, while there were only 14 deaths in 13,063 viable vaginal deliveries and only one of these was attributed to puerperal sepsis.

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Experimenting with the colon bacillus, Sodano found that the amount of agglutinins in the milk of the nursing mother was nearly as great as in her blood serum. In a group of patients who were immunized to the colon bacillus by vaccines during the latter part of pregnancy the milk was greatly inferior to the blood serum in agglutinin content, showing that the agglutinin content of the milk is not increased by increasing the blood serum content.

JAMES M. PIERCE.

THE TREATMENT OF ELUSIVE ULCER OF THE BLADDER BY THE APPLICATION OF PURE PHENOL*

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IN 1914 Hunner¹ described a lesion of the urinary bladder to which, because of the difficulty experienced in locating it, even when its existence was suspected, he applied the name "elusive ulcer." In 1921 Kretschmer² described his experience with this condition and called attention to the fact that Nitze³ in 1907 had described a bladder ulcer identical with the one discovered by Hunner. Relatively infrequent, this lesion occurs often enough to be seen by the gynecologist three or four times yearly.

The most conspicuous symptom of this lesion is distress of long duration. The complaint of the patient is usually expressed as frequency of urination and burning during the act. Careful questioning will, however, frequently reveal the occurrence of a suprapubic pain when the bladder is full, and the occasional appearance of a small amount of blood in the urine when the patient has been forced to postpone emptying it. The burning and frequency may be due to complicating chronic urethritis and trigonitis, but suprapubic pain accompanying vesical distention directs attention to the possibility of "elusive ulcer." Intolerable frequency is an all important symptom.

A description of the histopathology of this ulcer has been carefully made by Hunner,¹ Kretschmer,²⁻⁴ Frantz⁵ and others. The lesion when seen by cystoscopic examination usually appears in the vertex or dome of the bladder. Keene⁶ states that in none of his twenty patients was the trigone or ureteral area involved. The lesion is seen as a small, usually single superficial abraded area, which bleeds easily. Under good illumination one finds a pale, elevated, edematous area several centimeters in diameter surrounding this superficial ulceration. At one time or another the epithelium may be temporarily intact and the lesion easily overlooked. I have on occasion searched five or six times for an ulcer, the existence of which was suspected from the history.

One whose practice is limited to diseases of women has an advantage in the use of the Kelly cystoscope and the knee-chest posture. With this method one looks easily at the vertex or dome of the bladder through air. The sudden distention of the bladder through the Kelly instrument often causes the ulcer to bleed, and the trickle of blood traced to its source discloses it. If one suspects this lesion and sees the pale edematous area of thickened bladder wall, a stroke with a

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cotton applicator may produce bleeding and also cause the patient to exclaim with pain which she will identify as the one which has caused her to seek treatment. Using the end of the cystoscope as a measure, the exact size of the area may be determined.

Besides the cystoscopic findings, physical examination discloses little. The urine from patients with *uncomplicated* "elusive ulcer" shows only rare white and red blood cells. Vaginal examination may reveal tenderness of the bladder in the region of the ulcer. The occurrence of suprapubic pain, the chronicity of the lesion, the scarcity of abnormal elements in the urine and the difficulty in locating the lesion on cystoscopic examination has frequently led to unnecessary operations upon the abdominal and pelvic organs.

The treatment of this condition has not been satisfactory.

Hunner,¹ Kretschmer,²⁻⁴ Frontz,⁵ Keene,⁶ and others for some time resected the ulcer-bearing wall of the bladder with rather unsatisfactory results. Recurrences were fairly frequent and in some instances a second operation was performed. Kretschmer⁷ and Furniss⁸ were among the first to report favorable results with the use of high frequency fulguration. This procedure is still used and will give long periods of relief. It usually requires, however, an anesthetic and promises no permanency of cure. I have seen two rather brisk hemorrhages eight to ten days after treatment. Bumpus⁹ has had success with hydraulic distention under general anesthesia.

When ureteral stricture is present many of the cases are relieved by dilatation of the stricture, with or without the application of silver nitrate to the ulcer. Regardless of local treatment, *infection, either focal or any other portion of the urinary tract must be eliminated*. One must also keep in mind the fact that urethrotigonitis is a frequent accompaniment of elusive ulcer and will be confusing in the treatment as well as in the diagnosis.

Since treatment of this condition has been, up to date, rather uncertain and unsatisfactory, I wish to call attention to a simple, painless and inexpensive method which has so far been very satisfactory. After noting the beneficial effect of pure carbolic acid on ulcerative cystitis remaining after the removal of a tuberculous kidney, I used this agent in treating an elusive ulcer. I have now had four such cases. The treatment is always carried out in the office and is as follows: Ten per cent cocaine is applied to the urethra for five minutes, the bladder is then emptied by catheter, the patient placed in correct knee-chest posture, the vaginal orifice opened to allow air to enter the vagina, and a Kelly cystoscope introduced into the bladder. By means of a head mirror and reflected light, the lesion is located and studied, and, after aspirating all urine from the bladder vertex, is thoroughly swabbed with pure phenol. If any of the solution touches the normal mucosa it is immediately neutralized by an applicator saturated with alcohol. After the ulcer is thoroughly painted, the patient remains in

the knee-chest posture, with the cystoscope in place, for a few seconds until the action of the phenol has taken place. As the cystoscope is withdrawn, if the trigone and urethra are inflamed, they are painted with 10 and 5 per cent silver nitrate respectively. The air is then allowed to escape and the patient to go about as usual. There is often some increased discomfort for a few days about which the patient should be warned. The lesion is then inspected in about two weeks and may or may not require more treatment. At first I was afraid that the pure phenol would cause a slough and I not only immediately applied alcohol but did not paint the entire area thoroughly. I soon discovered that thorough application produced no untoward effects.

CASE REPORT

CASE 1.—Mrs. G., aged fifty-four. First seen on Mar. 3, 1932, complained that for several years she had frequent, painful urination, and a dull burning sensation deep in the lower left side of the pelvis. For several weeks there had been blood in the urine. Complete cystoscopy revealed a slight stricture of the right ureter and urethrotrigonitis. A few erythrocytes were found in a catheterized specimen of urine. Treatment of the ureteral stricture and urethritis gave some relief, but the burning pain in the lower left side and attacks of hematuria continued. On May 26, 1933, an ulcer of the elusive type was discovered in the left lateral wall about 3 cm. from the left ureteral meatus. Several applications of silver nitrate gave some but very temporary relief. On July 31, 1933, pure phenol was applied to the ulcer. The patient when last seen Dec. 28, 1934, was well and had had no symptoms since the application of phenol seventeen months previously.

CASE 2.—Mrs. S., aged fifty-four, first seen Jan. 18, 1932, complained of frequent and burning urination for eight months. After complete examination a diagnosis of chronic urethritis and trigonitis was made. Dental examination revealed an apical abscess and three other "suspicious" teeth. The abscessed tooth was removed. The patient was treated for trigonitis with considerable improvement. On Oct. 26, 1932, an elusive ulcer was discovered. The application of 10 and 20 per cent silver nitrate on several occasions produced some improvement, but there were frequent recurrences. On July 12, 1933, pure phenol followed by alcohol was applied to the bleeding area of the ulcer. A thorough application of phenol was made to the lesion on May 29, 1934. Since then there has been no recurrence of the ulcer. There have been occasional attacks of urethritis, but the patient has not yet had the "suspicious" teeth treated.

CASE 3.—Miss B., aged forty-six, seen Mar. 20, 1934, had had bladder trouble for nine years. Five years ago, a local urologist suspected tuberculosis of the kidney and bladder. She then went to another city where the diagnosis of Hunner ulcer was made. Animal inoculation at that time was negative for tuberculosis. The ulcer was fulgurated and treated with silver nitrate. The patient remained symptom-free for four years. My examination showed the old ulcer which was red and bled easily. It was about 3 cm. in diameter and was in the left part of vertex. Catheterized urine revealed many erythrocytes and a few pus cells. Three applications of silver nitrate were of little benefit. On April 7 and 21, and May 5 and 19, phenol was thoroughly applied. The patient, last seen on Oct. 19, 1934, stated that she had had no symptoms of any kind since her phenol treatment in April. The ulcer was perfectly healed but the urine contained pus. Since her

previous visit I had learned that three animals inoculated by the local urologist five years ago were actually positive for tuberculosis. A specimen of urine, containing numerous pus cells, was sent for animal inoculation and was reported positive for tuberculosis on Dec. 6, 1934. This patient has a typical "elusive ulcer," which seems to be accompanied by renal tuberculosis. Hunner¹⁰ has several times had the same experience, and has found no evidence of tuberculosis in the tissue of the excised ulcer. A letter has been sent asking this patient to return for further study.

CASE 4.—Mrs. B., aged fifty-two, seen Oct. 5, 1934, complained of pain in the lower abdomen with severe day and night frequency and burning of urination for five years. She had also noted a tender spot just above the pubis. Cystoscopic examination four years ago is said to have given negative findings. On Aug. 23, 1934, an hysterectomy for uterine fibroids was done and a urethral polyp was removed. This operation had no effect upon the pelvic pain. My examination revealed a tender bladder and a few red blood cells in the urine. Kelly cystoscope examination showed a definite elusive ulcer at the junction of left base and vertex, also chronic urethritis. The touching of the ulcer with an applicator reproduced the pain for which the patient had consulted me. Pure phenol was applied to the ulcer on October 10 and 26. Five per cent silver nitrate was applied to the urethra on these dates and on October 19. On November 30 the ulcer was healed and for the first time in five years the patient had no symptoms. Definitely infected tonsils are to be removed soon.

SUMMARY AND DISCUSSION

Four cases of elusive ulcer of the bladder are reported. Overcautious at first, I soon found that the thorough swabbing of the ulcer caused very little distress and no complications, and was followed by prompt and prolonged relief.

A letter to Dr. Hunner in August, 1933, brought the reply that he had not used this treatment but would do so. The following is a quotation from his letter of Sept. 27, 1934: "I have had eight or ten cases since you wrote me about this and I have had nothing before to compare with the immediate results. Of course I have not had more than six or eight months on any of them, not long enough to say how long the results are going to hold. I have had enough experience with it, however, to feel that it is going to be a tremendous addition for our therapy in this rather unsatisfactory line of work." Hunner's experience encouraged me to report my small group of cases.

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THE USE OF DILAUDID IN GYNECOLOGIC SURGERY

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WHILE there are several reports in the foreign literature on the use of dilaudid (*dihydromorphinone hydrochloride*) given alone or with other drugs to relieve pain, a critical examination of the American literature fails to reveal any report on the use of dilaudid and scopolamine in surgery. The publications which have appeared may serve as criteria for matters of dosage, safety, and to suggest the possibilities of dilaudid in relieving pain in many fields of medicine.

Alvarez¹ first used the drug in America for the amelioration of pain in inoperable carcinoma, reporting quite favorably on it in August, 1932. Since then, Ruch² has reported good results with a combination of dilaudid $\frac{1}{32}$ gr. (0.002 gm.) and scopolamine $\frac{1}{130}$ gr. (0.0005 gm.) in producing analgesia in obstetric cases. Jacobs³ also found dilaudid, when used alone or with scopolamine, capable of inducing a satisfactory analgesia for labor, yet without prolonging it, or without an untoward influence on the child. Weum⁴ called attention to the use of dilaudid given in conjunction with a barbiturate in labor, postpartum and postoperative, and commented favorably on the action of the rectal suppositories.

In order to ascertain a satisfactory method of using dilaudid and scopolamine for surgical cases, our study was directed toward the use of this combination in gynecologic surgery.

One of the first European reports in this field was that of Ellerau,⁵ who reported favorably on the use of dilaudid and scopolamine given preoperatively. Later von Oettingen,⁶ who studied a similar combination given to almost 500 patients requiring gynecologic surgery, found it to produce a most satisfactory analgesia in over one-third of his cases, while about 60 per cent of the total number were only disturbed at times during the course of minor operations. More recently, Jost,⁷ in a comprehensive series of 1,514 cases, gave $\frac{1}{32}$ gr. (0.002 gm.) of dilaudid and $\frac{1}{200}$ gr. (0.0003 gm.) of scopolamine two hours, and again one hour before the operation. An hour before the first injection, 0.5 gm. of veronal was given. In over 95 per cent of these cases, minor operative procedures could be carried on without an additional narcotic, though in some cases, the sleep was not deep enough to wholly prevent any reaction. Grossmann⁸ and others have reported on the use of dilaudid alone preoperatively.

In this paper, we are reporting the use of dilaudid in a series of 225 gynecologic cases, largely surgical. This series consists of 100 cases where dilaudid-hyoscine was used preoperatively, 160 cases where dilaudid alone was used postoperatively, and 65 cases in which dilaudid suppositories were used postoperatively.

In the table below are given the types of cases and the number of each type, where dilaudid was used preoperatively with hyoscine. Hyoscine has exactly the same pharmacologic action as scopolamine.

Curettage, biopsy or radium implant	22
Vaginal and cervical plastic	24
Vaginal plastic and laparotomy	8
Suspension operation	4
Adnexal operation	10
Hysterotomy and sterilization	2
Supravaginal hysterectomy	14
Complete hysterectomy	14
Vaginal hysterectomy	2
Total	100

In each case (except in the small series where spinal anesthesia was used), two injections of hyoscine of $\frac{1}{130}$ gr. (0.0005 gm.) each were given, combined with varying amounts of dilaudid. The first injection, consisting of dilaudid and hyoscine, was given one hour and forty-five minutes before the operation. The second injection was given one hour before the operation and consisted of hyoscine alone or in combination with dilaudid. The only sedative given consisted of a small dose of a barbiturate the night before operation. Table I shows the amounts of dilaudid used in all the cases and also the types of anesthesia.

TABLE I

DOSAGE	PREOPERATIVE				POSTOPERATIVE		
	$\frac{1}{48}$ GR. DILAUDID 2 $\frac{1}{2}$ C.C. HYOSCINE	$\frac{1}{32}$ GR. DILAUDID 2 C.C. HYOSCINE	$\frac{1}{48}$ GR. DILAUDID 1 C.C. HYOSCINE $\frac{1}{128}$ GR. DILAUDID 1 C.C. HYOSCINE	$\frac{1}{32}$ GR. DILAUDID 1 C.C. HYOSCINE	$\frac{1}{48}$ GR. DILAUDID	$\frac{1}{32}$ GR. DILAUDID	$\frac{1}{24}$ GR. DILAUDID SUPPOSITORIES
No. of Majors	10	5	32	7	5	139	38
Anesthetic	Gas	Gas	Gas	Spinal	-	-	-
	Ether	Ether	Ether				
Analgesia and Amnesia	Fair	Good	Good	Good	Fair	Good	Good
Respiratory Depression	No	Yes	No	No	No	No	No
No. of Minors	5	41	-	-	12	4	27
Anesthetic	Gas 3	Gas 25	-	-	-	-	-
	None 2	None 16	-	-	-	-	-
Analgesia and Amnesia	Good	Good	-	-	Good	Good	Good
Respiratory Depression	No	No	-	-	No	No	No

In a small series of five cases, $\frac{1}{32}$ gr. (0.002 gm.) of dilaudid was used with the first injection of hyoscine and none with the second. This was discontinued, because in three out of the five cases there was such a marked respiratory depression before the anesthetic was started that the operation had to be delayed until the breathing had been stimulated with CO_2 inhalations. Therefore, $\frac{1}{48}$ gr. (0.0013 gm.) of

dilaudid was substituted for the $\frac{1}{32}$ gr. No respiratory depression was noted. But in these analgesia and amnesia was not of sufficient depth except where the individual was small or senile. Therefore, the second injection of hyoscine was supplemented with an additional $\frac{1}{128}$ gr. (0.00047 gm.) of dilaudid. Apparently then, the proper dosage for major cases had been found. Respirations were not depressed in this whole series. Nitrous oxide-oxygen-ether was used. Its induction was easy throughout, and slightly less was used than in a large control series using $\frac{1}{6}$ gr. (0.01 gm.) morphine instead of dilaudid. Dilaudid was also used in a small series of cases followed by spinal anesthesia. In these, 1 $\frac{3}{4}$ gr. (0.12 gm.) of luminal was given the night before operation, 10 gr. (0.6 gm.) of sodium barbital one and one-half hours before the operation and one injection consisting of $\frac{1}{32}$ gr. of dilaudid and $\frac{1}{130}$ gr. of hyoscine one hour before the operation. The spinal anesthesia consisted of 3 gr. (0.2 gm.) of novocaine crystals dissolved in spinal fluid. Only in a few cases where the operation was unusually long was a small amount of gas-ether required.

In minor operations we found that $\frac{1}{32}$ gr. of dilaudid given with the first injection of hyoscine and not repeated with the second was well tolerated as only gas or no additional anesthesia was used. If the individual was small or senile, we found that $\frac{1}{48}$ gr. of dilaudid was sufficient. As can be seen from the table, almost half of the minor operations were carried out without any anesthesia. The results were uniformly as good as in the major operations.

There is indication of definite synergistic action between dilaudid and hyoscine. Care must, therefore, be exercised in the use of the larger dosage, especially when followed by deep surgical anesthesia, because of the danger of respiratory depression. It is apparently possible to obtain satisfactory analgesia and amnesia with reduced doses of hyoscine.

As to the analysis of individual cases, it was found that complete analgesia and amnesia were obtained in 83 per cent of the cases, moderately good in 15 per cent and poor in only 2 per cent. The action was more prompt with dilaudid than with morphine, the patient becoming drowsy five to eight minutes after the first injection. The amounts of inhalation anesthesia were definitely decreased and the patients reacted sooner after the operation.

In 160 cases, dilaudid alone was used postoperatively by means of hypodermic injection and in 65 cases by rectal suppository. Injections of $\frac{1}{48}$ gr. doses were used in small or senile individuals or where the pain was only moderate. Doses of $\frac{1}{32}$ gr. were used in the others.

Our results agree in the main with those of German investigators named above and others, including Siebner,⁹ Sterchele,¹⁰ and Seeliger.¹¹ Dilaudid relieved pain as well as, if not a little better than, morphine

and, of course, in much smaller doses. The action was more prompt with dilaudid and the mental faculties did not remain dulled as long afterward. Dilaudid did not depress the patient as much as morphine. The patient was clearer, more cooperative in her nursing care, and better able to feed herself and take fluids. Less inhibition of peristalsis with dilaudid than with morphine in laboratory tests has been reported. We found this to be true clinically, because there was definitely less distention when dilaudid was used in place of morphine. Less catharsis was employed and there were no cases of ileus in the entire series. Vomiting was definitely decreased. We also noticed that the number of postoperative catheterizations was slightly decreased when dilaudid was used.

The $\frac{1}{24}$ gr. (0.0025 gm.) of dilaudid rectal suppository is a very easy and efficient way to administer the drug. Pain was relieved within fifteen to twenty minutes and for considerably longer periods of time than when given hypodermically. No untoward results were obtained. Since this series was completed we found the suppositories especially useful in the relief of pain in cases of advanced pelvic carcinoma.

CONCLUSIONS

1. Dilaudid may replace morphine in surgery.
2. It relieves pain and requires smaller doses.
3. There is evidence of synergism between dilaudid and hyoscine.
4. Dilaudid in larger doses, especially with hyoscine, causes respiratory depression.
5. The reaction and recovery from narcosis are more prompt with dilaudid.
6. There is less postoperative distention and less need of catharsis with dilaudid.
7. There is less vomiting with dilaudid.
8. Postoperative catheterization was required slightly less frequently with dilaudid.
9. Suppositories form an excellent means of administering dilaudid for a more prolonged action.

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ECTOPIC PREGNANCY

THE RESULTS OF IMMEDIATE OPERATION AND THE VALUE OF SPINAL ANESTHESIA

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IN THE five-year period from Jan. 1, 1929 to Jan 1, 1934 out of 6,581 laparotomies on a general surgical service, ectopic pregnancy was encountered sixty-nine times. These patients were all operated upon on one service by one operator who followed a routinized surgical procedure. They all received spinal anesthesia, no distinction being made between the so-called tragic cases and the others, or between those having higher or lower blood pressures. Appendectomy was routinely performed in all cases in which the organ had not been previously removed. In quite a few instances where other pathology was encountered multiple operations were performed, despite the fact that considerable bleeding had occurred into the peritoneal cavity. This pathology was not directly associated with the ectopic pregnancy, for example, myomas of the uterus, or cholecystitis with cholelithiasis. In all the instances of ruptured ectopic pregnancy or tubal abortions with hemorrhage into the peritoneal cavity, laparotomy was performed as soon after admission to the hospital as the patient could possibly be prepared.

We have analyzed and tabulated the leading signs and symptoms of our cases as follows: The outstanding symptom in all cases was abdominal pain. While this pain was occasionally generalized, in most instances it was localized to one side of the lower abdomen or suprapubically. It was present in 64 of the total number of cases. Amenorrhea was encountered in only 34 cases. Irregular menstruation followed by abdominal pain was noted in 25 instances. By irregular menstruation we mean that either the menstrual period began at the normal time, continued as a normal period but then instead of stopping was prolonged as spotting for an indefinite time, continuing from a few days to several weeks, or else the period, beginning at the normal time, was short and after a lapse of a few days continued again as spotting. Combining this irregularity with the cases which showed amenorrhea, in 59 instances there was a history of either a postponed period, prolonged period, or a skipped period. Spotting after amenorrhea, which is considered the typical irregularity of menstruation in ectopic pregnancy was found in only 37 of our cases. It seems very significant that in 7 instances there was no abnormality of menstruation whatsoever. Fainting occurred in 15 cases, nausea and vomiting in three cases, and distant pain, located in the clavicles, or in the shoulder blade was noted 6 times.

An analysis of the physical findings is as follows: In 29 cases pallor was manifest. Abdominal tenderness was present in 62 cases and abdominal spasticity in 42. Rebound tenderness was noted in 29 instances and a mass (palpable either

abdominally or on bimanual examination) was found in 42 instances. The cervix was tender on motion in 31 cases. Abdominal distention was present 4 times. The uterus was enlarged in 9 cases, 3 of which were cornual pregnancies. In 4 cases the hemoglobin ranged from 30 to 40, in 12 between 50 and 60, and in 13 it was between 60 and 70; in all the rest it was above 70 per cent. The estimations were all made immediately before operation. The following blood pressure readings were recorded at the time of operation or just before operation. Of the 60 tubal abortions or ruptured tubes, in only 25 was the systolic blood pressure found to be below 90 at the time of operation. Of these 25, 2 were so low as to be unobtainable by the ordinary sphygmomanometric method. In 4 the systolic was below 50. In 13, it was between 50 and 80. In 6 it was between 80 and 90. In the remainder the systolic blood pressure was above 90, just before operation.

The tabulation of the operative procedures is as follows: in 21 cases a simple salpingectomy with conservation of the ovary on that side was performed; in 5 salpingo-oophorectomy was done; in 22 instances a salpingectomy and appendectomy was performed; in 11 salpingo-oophorectomy and appendectomy was performed. In 10 cases the procedure was more complicated as follows, (A) salpingo-oophorectomy myomectomy and appendectomy (1 case); (B) salpingo-oophorectomy, sterilization of the opposite side, appendectomy (1 case); (C) salpingectomy, sterilization (1 case); (D) supracervical hysterectomy for unruptured cornual pregnancy with appendectomy (3 cases); (E) salpingo-oophorectomy and opposite side salpingectomy (1 case); (F) right salpingectomy, appendectomy and cholecystectomy (2 cases); (G) salpingo-oophorectomy, appendectomy and perineal plastic, (1 case). In this group of ten cases with the exception of the unruptured cornual pregnancies, there was considerable blood in the peritoneal cavity at the time the accessory operative procedures were performed. In both cholecystectomy cases separate right upper quadrant incisions were made.

At laparotomy, 31 tubal abortions, 29 ruptured tubes, including one ruptured cornual pregnancy, and 9 cases of unruptured ectopic pregnancy, of which 3 were cornual, were found. In 62 of the patients there was no other associated pathology besides the ectopic pregnancy. In 7, chronic salpingitis was found. In one there was a bilateral cystic oophoritis with tuberculosis of the tube. In one case there was a hydatid mole in the ectopic pregnancy, and also an associated cholelithiasis. In one case there was multiple fibromyomas, in another case there was cholelithiasis, and one patient had a pregnancy in a rudimentary horn of a uterus bicornis unicollis. This is of interest because of the possible etiologic relationship of associated pathologic lesions in the development of ectopic gestation.

The postoperative course in general was uncomplicated. There was one death. The case was one of a ruptured cornual pregnancy with considerable hemorrhage and shock. Intravenous glucose was given immediately upon admission to the hospital and continued throughout the operation. At the time of operation (it was performed without delay), the blood pressure was 90/50. The tube and the cornual portion of the uterus was excised and the cornual area closed by continuous suture. No other intraabdominal procedure was performed. During the operative procedure the patient developed circulatory failure but was resuscitated. However, about two hours after the operation the patient died in circulatory failure.

In twelve cases because of the poor circulatory condition of the patient, it was deemed necessary to give fluids intravenously before and during the operative procedure. This consisted of 5 per cent glucose solution to the amount of 1,000 c.c. Twenty patients received fluid parenterally, postoperatively. Three patients received whole blood postoperatively. In twenty-one cases the postoperative course did not require any parenteral fluid and was entirely satisfactory. One patient developed severe postoperative distention which yielded to treatment after a few days. An-

other was complicated by bilateral pyelitis and cystitis which cleared up upon treatment. There were no other significant postoperative complications. The average time in the hospital was two weeks.

Ectopic pregnancy is not a rarely encountered condition. According to E. A. Schuman's statistics, its incidence relationship to that of normal pregnancy is 0.38 per cent. Keeping that in mind will be one of the greatest aids diagnostically.

For a full discussion of the etiology of ectopic pregnancy, reference should be made to the writings of Schuman,¹ Wynne,² Farrar,³ and Leith Murray.⁴ In our series, in eight cases obstructive factors were found, seven cases of salpingitis and one case of tuberculosis of the tube. In none of the others was there any gross sign pointing toward any etiologic factor. Most ectopic pregnancies occur in multiparous women. This was not only true in our series but also found to be true by almost all contributors on the subject. It is generally agreed that once the diagnosis of ectopic gestation has been made, the patient should be prepared for laparotomy as soon as possible. There is still some difference of opinion regarding treatment after tubal rupture, the majority agreeing however, that immediate operation is preferable to any conservative treatment. The observation of Hunter Robb that severing the ovarian arteries of pregnant bitches did not kill the animals gave rise to the hibernation treatment of ectopic gestation.

The idea underlying the hibernation treatment is that the primary rupture, while possibly serious, is usually not fatal, since in the main, an arterial twig and not a large vessel is involved. According to this idea the bleeding continues until the blood pressure falls sufficiently for the formation of a clot and then the patient reacts, feeling well in a day or two. During the reactive stage the operation can be performed more safely. This particularly summarizes the teaching of the late Dr. John O. Polak. While this may be true of a large majority of cases, it certainly is not true of all. It is indubitably true that the majority of the patients *in extremis* do react and may be operated upon with comparative safety some time after the reaction. It is equally true, however, that no one can foretell whether the reaction will take place, or whether the patient will slip momentarily further and further beyond surgical aid and death end the scene without any more active attempt having been made to save the life of the woman than giving her morphine, hypodermic and proctoclysis and the Trendelenburg posture. While the resources of surgery are rarely successful when practiced on the dying, yet of all acute surgical conditions, ruptured ectopic pregnancy is one in which even when patients are operated upon almost in extremis, they recover with most surprising rapidity.

In the past the fear of operating was engendered by the idea that the operation added shock to an already existing shock, the combination of

which might prove fatal. In ruptured ectopic pregnancy, the picture is one of hemorrhage.

The hibernation treatment of ectopic pregnancy has frequently been advocated for the same reasons as those advanced for the expectant and palliative treatment of bleeding ulcers of the stomach. From a therapeutic approach standpoint the two are by no means comparable. In many instances of bleeding ulcer, it is impossible to find a bleeding vessel for ligation. Either the very extensive operation of subtotal gastrectomy or pylorotomy on an already exsanguinated patient must be performed or recourse must be had to gastroenterostomy, in the hope that drainage might indirectly favorably influence the hemorrhage. However, in the case of ectopic pregnancy the bleeding point is always accessible for easy ligation. From the standpoint of the therapeutic indication there is a very close parallelism between the hemorrhage of a ruptured tubal pregnancy and that due to slipping of a ligature on a vascular pedicle after laparotomy. In case frank hemorrhage were recognized post-operatively as the result of a slipped ligature what surgeon would hesitate to reoperate for the control of such hemorrhage?

Lilian K. P. Farrar³ reported 3 deaths in 303 cases in all of which operation was not deferred. Scheffey et al.⁵ report two postoperative deaths out of 82 patients operated upon immediately or within twenty-four hours. Leith Murray reports two deaths out of 146 patients similarly treated. In all these patients the authors explained their deaths as not being due to the operative interference but rather to some intercurrent accident such as postoperative pulmonary embolus on the eighth or tenth day or septic pneumonia.

An important factor in minimizing the trauma of the operative procedure in a woman already damaged by a severe intraabdominal hemorrhage, is the choice of subarachnoid block as the anesthetic. Maximal relaxation is afforded, which in turn insures easy, speedy operating with minimal tissue trauma. Shocking impulses generated in the operative field, blocked in the anesthetized spinal roots and cord, never reach the brain so that the central nervous system is spared. The fear that many of these patients already having a low blood pressure are not fit for spinal anesthesia because of its depressing effect on pressure, is entirely unwarranted. The Trendelenburg posture insures sufficient gravity drainage back to the heart to prevent its contractions on empty chambers, no matter how complete the peripheral and splanchnic vasodilatation be. Indeed, the lower the pressure before anesthesia, the less can the fall attributable to the anesthetic be. Although there were only 2 cases in this series in which no sphygmomanometric blood pressure readings could be obtained, we have operated on 6 other such cases due to tubal rupture, 3 cases of gastric ulcer hemorrhage, 1 case of traumatic rupture of the spleen, 1 case of laceration of the liver, and 1 case of laceration of the kidney. In these 12 cases also, sphygmomanometric readings were unobtainable because the pressure was so low. These ex-

periences in extreme cases, besides a familiarity with the uselessness of blood pressure readings as a criterion of a patient's condition during operation under spinal anesthesia gained in over 10,000 laparotomies, make us feel that ectopic pregnancy is not only no contraindication to the use of this anesthetic, but that it is suitable for use in this condition.

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OCCIPUT POSTERIOR

A STATISTICAL STUDY FROM THE CHICAGO MATERNITY CENTER

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IN THE realm of obstetrics there is probably no topic which has been productive of more diverse and conflicting opinions than that supporting the methods advocated by various clinics in the management of occiput posterior positions. For this reason it is enlightening and helpful to review a large series of cases and thus to determine if possible wherein we have triumphed or failed. Many of these statistical studies are inaccurate for obvious reasons. The figures of hospitals are frequently at fault because they include a disproportionately large number of primiparas, in whom occiput posterior is generally recognized to be of more serious import than in multiparas; also because many patients are sent to hospitals only after attempts at delivery in the home have failed in the hands of the less skilled, or because dystocia is anticipated; and because operative interference is always more readily undertaken where it is more convenient. On the other hand, a series of cases taken from the private practice of trained obstetric specialists is apt to be equally misleading, since many cases fall into their hands only because they are pathologic and in need of skilled attendance. For the purposes of this study, we have selected the statistics of the Chicago Maternity Center, which is entirely an out-patient service, where all kinds of normal and operative obstetrics, with the exception of cesarean section, are undertaken in the homes. Hence, we believe this service is more likely to represent a cross-section of the general run of obstetric practice to be found throughout the country as a whole.

Most of the recent publications on this subject have shown a rather large proportion of operative deliveries. While these may be productive of good results in the hands of the skilled obstetrician in a well-equipped maternity, in the hands of the average practitioner, who still must do

most of his deliveries in the home, such interference will inevitably be unsatisfactory to say the least, at times even disastrous. A study of the figures about to be presented will reveal a tendency toward a strongly conservative attitude in our clinic, operative interference being resorted to only when strictly indicated, and then the interference in all cases is as radical as the circumstances require.

In presenting these statistics, there is, we believe, one figure which may well be challenged. Of the 7,803 deliveries in the twenty-nine-month period covered by this study, 6,223 are known to have been vertex presentations; and of these occiput posterior was diagnosed in 714 cases, an incidence of only a fraction under 11.5 per cent, which is one of the lowest on record. DeLee presents the statistics of the Chicago Lying-in Hospital as supporting an incidence of 12.1 per cent, and he quotes Karl Braun as giving the much larger figure of 30 per cent. Williams offers 20.8 per cent as his experience, and says that Plass was able to find only 11.1 per cent in 5,445 vertex presentations delivered at the Johns Hopkins Hospital. All of these figures, like our own, seem open to the criticism voiced by Danforth, who states: "In many services in which the observations are made and recorded by internes, the cases in which anterior rotation occurs are recorded as anterior positions, and the primary posterior escapes recognition." Danforth, by the way, says that occiput posterior has been encountered in 27.1 per cent of cases in his private practice, but this large incidence must fall under the objection we have already made to the statistics of the skilled obstetrician. In a small series of personally conducted home and hospital deliveries, I have recorded occiput posterior position in 28 per cent of vertex presentations, which seems unduly high. At any rate a mean of all these figures gives an incidence of 20 per cent, which seems to approximate the true state of affairs about as closely as possible.

Table I shows the incidence of the various presentations encountered on this service.

TABLE I. TOTAL DELIVERIES FROM JULY 1, 1932, TO DEC. 1, 1934, 7,803

Unattended (precipitated before arrival of doctor)	1,316	or 16.8%
Total attended deliveries	6,487	
Vertex presentations	6,223	96.0 %
Breech	222	3.4 %
Face and brow	23	0.35%
Transverse	19	0.29%
Total occiput posterior	714	11.5 % of all vertex cases
Occiput right posterior	489	
Occiput left posterior	225	
Primiparas	196	
Multiparas	518	

Of these 714 occiput posteriors, 614 or 86 per cent terminated in spontaneous delivery. On the other hand, if it is true, and in all likelihood it is, that 20 per cent of the 6,223 would be found to have been occiput

posteriors had more skill and care been employed in diagnosis and recording, then the operative incidence in this series is only 8 per cent, and 92 per cent of all our posterior cases have delivered spontaneously. Table II shows the frequency of the various modes of termination in the 714 deliveries.

TABLE II

Spontaneous rotation and delivery	573 or 80.2 %
Manual rotation, spontaneous delivery	3 or 0.42%
Spontaneous delivery, persistent occiput posterior	38 or 5.32%
Operative delivery	100 or 14.0 %

A review of the 100 operative deliveries reveals that all of them were strictly indicated interferences and also that by far the majority of them were difficult procedures. That the average length of the second stage in this group was 3.37 hours, with a mean first stage of 27.7 hours, will give some lead to the necessity of the operations done. In the nineteen cases in which dilatation of the cervix was completed by Dührssen's incisions, the first stage of labor averaged 48.5 hours, the longest being seventy-four hours and the shortest thirty-five hours. This operation is performed only under the most rigid indications, and then only when the proper conditions are present, and after the woman has had a fair test of labor with membranes ruptured, or when fetal or maternal distress demands rapid delivery before the cervix is completely dilated. All of these nineteen operations were performed upon primiparas. A statistical review of the 100 operations follows:

Total operative deliveries	100
Occiput left posterior	35
Occiput right posterior	65
Primiparas	85
Multiparas	15
Forceps Operations:	
High forceps (to be discussed later)	3
Midforceps	57
Low forceps	
After operative rotation	14
After spontaneous rotation	15
On after-coming head (version)	1
Key-in-lock maneuvers	26
Bill's Scanzoni modification	1
Failed forceps	1
Manual Rotation:	
Attempted	65
Failed	3
Succeeded	62
Version and Extraction	3
Dührssen's Incisions	19
Laparotrachelotomy	
1 primipara with cephalopelvic disproportion	
1 multipara with placenta previa totalis	
Craniotomy	5 (all on dead babies)

A close study of this summary of the operative work will demonstrate several very interesting points. In the first place, 70 per cent of all

these operations include high forceps, midforceps, version and extraction, craniotomy, or laparotrachelotomy, and only fifteen of the thirty low forceps were preceded by spontaneous rotation to an anterior position, which gives a good lead as to the urgent need of operative intervention. Another extremely interesting point is the success of manual rotation, which failed only three times in the sixty-five attempts, any manual rotation which effects a change to or beyond the transverse position being considered successful. Whatever may be said for or against this method by those who prefer forceps maneuvers, this much is certain, that rotation can be effected manually in the vast majority of instances, if it is persisted in by one familiar with the proper technic. We see also that forceps were used for rotation only twenty-seven times, twenty-six of these being key-in-lock maneuvers, most of which were utilized to complete a manual rotation which had already turned the head to or well beyond the transverse. The lone Bill-Scanzoni maneuver was performed upon a 335-pound multipara with a justo-major pelvis, who, because of uterine inertia and lack of cooperation, was unable to deliver spontaneously. Irregular fetal heart tones precipitated the decision to effect delivery, and the forceps were resorted to in preference to version, because the patient had a very bad upper respiratory infection, and it was deemed inadvisable to give her sufficient general anesthesia for the latter operation. Both mother and the baby made an uneventful recovery. In one of the other high forceps operations the baby died of cerebral hemorrhage; and the third was done on the after-coming head of a version and extraction, where cesarean section had been decided upon, but owing to failure of fetal heart tones while the patient was still at home, prompt delivery was resorted to, and both mother and baby are alive and well. It will also be noted that our methods differ from those of some clinics, in that all heads are rotated to the anterior position before the forceps are applied. In only one case was the head delivered in the posterior position, and that by a midforceps operation, both mother and child fortunately escaping injury.

Whether or not we are correct in our belief that all posteriors should be rotated before delivery is attempted, we must admit, is open to question. The recent work of Caldwell, Moloy, and D'Esopo upon the structure of the pelvis and the effect of its variations upon the course of labor seems to indicate that there may be certain cases in which the pelvis is best adapted to the passage of a posterior position. It will be noted that of the 614 spontaneous deliveries in our series, thirty-eight were expelled as persistent posteriors, many of them, even in primiparas, with surprising ease. This seems in some measure to bear out the contentions of those who advocate occasional extraction in the posterior position especially when the head has descended to the perineum, and it is probably best to try to learn which method promises the easiest delivery.

While we contemplate no change in our methods at the present time, we must acknowledge that the last word has not yet been spoken, and these new and interesting studies in the morphology of the female pelvis may some day cause us to change our minds about many things. Two of the versions were done upon multiparas with high occiput posteriors and both were productive of living babies; the third was done upon a premature infant with a prolapsed cord, and the baby lived only twenty-four hours. The two cesarean sections, as will be noted, were done for indications which made them absolutely necessary; the nineteen Dührssen's incisions have already been discussed, and indications for the five craniotomies will be brought out in the section on fetal mortality. Suffice it to say here that all of them were performed upon dead babies, as it is our policy never to permit the mother to suffer unneeded risk or damage for the sake of an infant that is known to have already succumbed.

We now turn to a discussion of our fetal and maternal mortality, but we shall not speak of morbidity, because in a service such as ours where temperatures are recorded as a rule only once daily, such observations are of little value. We can state empirically only that the incidence of febrile courses on our service seems to be unusually low, very few patients developing fevers which demand therapy of any kind. In the series of 714 occiput posteriors, we regret to report the death of one mother.

This patient was a twenty-five-year-old gravida ii who had had one previous spontaneous abortion. She had a mild case of pneumonia during her pregnancy, and from time to time complained of abdominal pain. She was delivered by manual rotation and midforceps, after which a severe postpartum hemorrhage necessitated manual removal of the placenta. Her puerperium was uneventful for the first eight days, and then she developed chills, fever, and a Bartholin abscess. This was incised and drained under a badly taken ether anesthesia, following which she developed pneumonia; she was sent to a hospital and died. Autopsy findings were those of a typical bronchopneumonia, such as is so frequently attributed to ether anesthesia. Incidentally this is the only maternal death that we have had on any of our operative deliveries since the beginning of the Chicago Maternity Center.

FETAL MORTALITY

There are seventeen fetal deaths recorded among the 714 deliveries, for a gross fetal mortality of 2.38 per cent; of these ten occurred in the operative series, making a gross operative mortality of 10 per cent. Deducting macerated babies, babies whose heart tones were inaudible when we arrived on the case, and others according to the indications outlined in the detailed account to follow, we have a corrected mortality of 1.54 per cent in the entire series, and the corrected operative mortality of 6 per cent, which is low enough considering the types of operatives involved. In this connection it must be emphasized that it is not our operative mortality that is to be considered, but the mortality of the entire

series, since a policy of intelligent expectancy seems to have been in large part responsible for the success obtained in the treatment of these cases. A detailed review of the fetal deaths follows:

- 2 Craniotomies on macerated babies; eliminated in corrected mortalities.
- 1 Craniotomy on fetus dead from long labor; included in both gross and operative mortalities.
- 1 Craniotomy on baby dead from complete abruptio placentae; included in gross and operative mortality.
- 1 Craniotomy on baby dead from failed forceps; included in both gross and operative mortality.
- 2 Died of cerebral hemorrhage after mid- and high forceps; included in both gross and operative mortalities.
- 1 Cause undetermined by autopsy, no evidence of cerebral injury; midforceps; death thought by mother to be due to accidental suffocation; may have been this or thymus; eliminated.
- 1 Second twin, single amnion and chorion with cords twisted and knotted together. Baby apparently died during labor; forceps; eliminated in operatives but included in gross.
- 1 Premature with prolapsed cord; died of cerebral hemorrhage after version and extraction; included in both.
- 1 Spontaneous delivery; persistent O.D.P.; died in thirty-six hours from cerebral hemorrhage.
- 1 Spontaneous; died in twenty-four hours. Autopsy; aortic occlusion, congenital.
- 1 Died in forty-eight hours. Melena neonatorum.
- 1 Cause undetermined, died eighteenth day; eliminated (Spont.)
- 1 Cause undetermined by autopsy; included in gross.
- 1 Stillborn; prolapsed cord; included in gross.

To recapitulate, a policy of intelligent expectancy was observed throughout the series of 714 occiput posteriors, interference being resorted to only where urgently indicated. The result, a fetal mortality of 1.54 per cent, speaks for itself; and while we do not claim that our methods are the "*sine qua non*" in the management of this very difficult problem, we are confident that our record should encourage their adoption by those who have been unable to find a system productive of results as good as or better than our own. This is no place to discuss operative technique, but it is only fair to state here that our problem in operative obstetrics in the home has been greatly simplified by the development of the parasacral block technique as described by Tucker and Benaron, and for practically all of our operations this very efficient regional anesthesia gives ideal or at least satisfactory results. Manual rotation is rendered much more successful than under general anesthesia because of the greater relaxation secured, and the operation of Dührssen's incisions is made a comparatively easy procedure; even two of the three versions were performed quite successfully with this type of nerve block.

SUMMARY

1. A series of 714 occiput posterior labors is presented with a corrected fetal mortality of 1.54 per cent and a maternal mortality of 0.14 per cent.

2. In this series operative intervention is undertaken in only 14 per cent, and in the 100 operative deliveries the gross fetal mortality was 10 per cent, and the corrected fetal mortality 6 per cent.

3. When operative intervention becomes necessary, manual rotation is considered the procedure of choice over the various forceps extractions, rotation being completed, when needed, by the key-in-lock maneuver with forceps. It is the policy to rotate all occiput posteriors to the anterior before attempting delivery.

4. It is estimated that occiput posterior positions occur in approximately 20 per cent of all vertex presentations.

5. Local anesthesia in the form of parasacral or pudendal blocks or combination of the two was employed successfully in practically all the operative deliveries.

3440 EDWARDS ROAD

CESAREAN SECTION: FACTORS INFLUENCING MORTALITY

AN ANALYSIS OF 243 CASES

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DURING the past decade the literature has been replete with discussions of the use and abuse of cesarean section. It is generally agreed that cesarean section is a conservative procedure if the indications are adequate and if the operator is skilled. It is often upon the general practitioner, however, that the burden of decision first falls.

The object of this communication is to analyze in some detail the cesarean sections which have been performed at the Miami Valley Hospital, Dayton, Ohio, during the eight-year period from Jan. 1, 1926, to Jan. 1, 1934, and to determine as far as possible the factors which influence mortality.

INCIDENCE OF OPERATION AND MORTALITY

As indicated in Table I, 9,527 women were delivered in the maternity division of the Miami Valley Hospital during the eight-year period. There were 243 cesarean sections, an incidence of one in each 39 hospital deliveries (2.55 per cent). The yearly operative incidence varies from 1 in 25 to 1 in 63 hospital deliveries. The operative mortality varied considerably from year to year. The mortality rate was highest (11.8 per cent) during 1930, even though the incidence of operation (1 to 39) was average for the entire series. The mortality rate was somewhat above the average during 1933, when the incidence of operation was lowest.

The classical cesarean section was done in 236 cases; the low cervical section in 3 cases; the Porro operation in 3 cases; and the vaginal section in 1 case. Ten of the 11 deaths followed the classical operation; one followed the Porro operation, which was complicated by previous rupture of the uterus with twin fetuses in the abdominal cavity.

TABLE I. YEARLY OPERATIVE INCIDENCE AND MORTALITY

YEAR	TOTAL DELIVERIES	CESAREAN SECTIONS	INCIDENCE OPERATION	DEATHS	PER CENT OF MORTALITY
1926	1,007	18	1 to 54	0	0.0
1927	1,110	29	1 to 38	0	0.0
1928	1,200	47	1 to 26	3	6.4
1929	1,313	52	1 to 25	2	3.9
1930	1,325	34	1 to 39	4	11.8
1931	1,305	27	1 to 48	1	3.7
1932	1,197	19	1 to 63	0	0.0
1933	1,070	17	1 to 63	1	5.9
Total	9,527	243	1 to 39	11	4.5

TABLE II. TYPES OF OPERATION

TYPE	NUMBER	INCIDENCE	PER CENT	DEATHS	INCIDENCE OF DEATH	PER CENT OF MORTALITY
Classical	236	1 to 1.03	97.1	10	1 to 24	4.2
Low cervical	3	1 to 81.0	1.2	0	0	0.0
Porro	3	1 to 81.0	1.2	1	1 to 3	33.3
Vaginal	1	1 to 243.0	0.4	0	0	0.0
Total	243		100.0	11	1 to 22	4.5

INDICATIONS

TABLE III. INDICATIONS FOR CESAREAN SECTION

INDICATIONS	NUMBER	PERCENTAGE
Contracted pelvis	103	42.2
Dystocia	34	14.3
Previous cesarean	27	11.0
Placenta previa	16	6.6
Eclampsia	14	5.7
Preeclampsia	9	3.7
Malposition fetus	7	2.9
Rigid cervix	5	2.0
Bicornate uterus	4	1.6
Ruptured uterus	4	1.6
Prominent sacrum	3	1.2
Placenta marginalis	3	1.2
Previous third degree laceration	2	0.8
Heart disease	2	0.8
Acute nephritis	2	0.8
Fractured pelvis	2	0.8
Uterine fibroid	1	0.4
Thyrototoxicosis	1	0.4
Prolapse cord	1	0.4
Previous myomectomy	1	0.4
Old ulcerative colitis	1	0.4
Previous abdominal injury	1	0.4
Total	243	100.0

TABLE IV. MATERNAL MORTALITY

INDICATIONS	HOURS OF LABOR	MEMBRANE	VAGINAL EXAM.	CESAREAN OPERATION	ADDITIONAL OPERATION	ANESTHESIA	CAUSE OF DEATH
Contracted pelvis Previous cesarean	4	Intact	1	Secondary	None	Spinal	Anesthetic death
Contracted pelvis	3	Intact	2	Primary	None	Ethylene	Acute purpura hemorrhagica shock
Ruptured uterus	0	Intact	1	Secondary	Hysterectomy	Spinal	Subhepatic abscess. Pelvic abscess. Right pulmonary atelectasis
Contracted pelvis Breech presentation	11	Intact	1	Primary	None	Ethylene	Peritonitis. Toxemia of pregnancy
Bicornate uterus Double genitalia	5	Ruptured	0	Secondary	Bilateral salpin- gitis	Ethylene	Postpartum hemorrhage. Purpura hem- orrhagica
Contracted pelvis Previous cesarean	3	Intact	0	Third	Steril.	Ethylene	Pneumonia
Dystocia	2	Intact	0	Primary	Bilateral salpin- gitis	Ethylene	Peritonitis. Incomplete closure wound. Pyeloneph.
Eclampsia	0	Intact	Insertion bag	Primary	None	Ethylene	Peritonitis. Ileus. Anuria
Contracted pelvis Face presentation	0	Intact	0	Primary	None	Nitrous oxide	Peritonitis
Dystocia	3	Intact	0	Primary	Bilateral salpin- gitis	Ethylene	Peritonitis
Dystocia	0	Intact	0	Primary	None	Ethylene	Cerebral embolism

In the analysis of the indications for operation, as recorded in Table III, an effort was made to group the cases according to the indications for operation. These data indicate that contracted pelvis still presents by far the most common indication for the cesarean operation. In most cases a trial of labor provided further evidence of contracted pelvis. Under the heading of dystocia was included disproportion of the size of the fetus and the pelvis. Inertia was also included under dystocia; no effort has been made to distinguish between primary and secondary inertia.

The dictum, "Once a cesarean, always a cesarean" appears to apply appropriately in all of the cases which were submitted to high classical cesarean section. It seems plausible that a patient who had previously been subjected to transverse cervical cesarean section would be less endangered during a subsequent trial of labor.

ADDITIONAL OPERATIONS

Sterilization operations, usually salpingectomy, were performed in ninety instances (40 per cent). Even though the percentage of sterilization operations is high in this series, this was done because of the knowledge that the mortality rate is decidedly increased with each succeeding cesarean section on the same patient. Appendectomy was performed in five cases. Such incidental operations as myomectomy, oophorectomy, and repair of ventral herniae, were performed. It is apparent that additional operations should not be performed unless the patient's condition warrants the additional interference.

GENERAL CONSIDERATIONS

The fetal membranes were ruptured before operation in 14 per cent of the cases. Vaginal examinations had been done prior to operation in 37 per cent of the cases. Delivery had been attempted by the application of forceps, insertion of bag, or version in 4 per cent of the cases prior to the performance of the cesarean section. Morbidity, which includes those patients with mouth temperature of 100°F. or more for over twelve hours, occurred in 40 per cent of the patients.

Information derived from the hospital records indicates that at least five of the patients who died following cesarean section had been subjected to vaginal examination prior to operation. The fetal membranes had been ruptured before operation in two cases. Seven of the patients had been in labor from two to eleven hours before operation. In one case a bag was inserted into the uterine canal before operation.

The mortality rate for persons who were subjected to a first cesarean section was 3.6 per cent; the mortality rate for those who were subjected to a second cesarean section was 7 per cent; the mortality rate was 20 per cent among those women who were cesareanized a third time. Vaginal examinations were done prior to operation in 37 per cent of the women in the entire series; vaginal examinations were done before operation in 46 per cent of the cases which ended fatally.

The average time for operation for the entire series was thirty-seven minutes, while the average operative time in the cases which ended fatally following operation was thirty-nine minutes. It seems probable that the operative time plays an insignificant rôle in the production of a fatal outcome.

Of the patients who died following operation, 73 per cent developed peritonitis, apparently produced by contamination from the vaginal outlet. The most frequent cause of such contamination was repeated preoperative vaginal examination, the use of douches, attempted delivery by forceps or bag, and lack of cooperation by the patient. It seems apparent that every obstetric case should be treated from the beginning of pregnancy as a potential operative case, thus avoiding contamin-

ation of the birth canal. Until this truth is realized the mortality rate in this country will remain excessive.

FETAL MORTALITY

TABLE V. FETAL MORTALITY

DEATHS ACCORDING TO INDICATIONS		CAUSE OF FETAL DEATH		
	NUMBER		NUMBER	PER CENT
Placenta previa	4	Premature	7	41
Abruptio placentae	3	Cause unknown	4	24
Eclampsia	3	Ruptured uterus	3	18
Ruptured uterus	3	Congenital syphilis	1	6
Prolapse cord	1	Pulmonary atelectasis	1	6
Dystocia	1	Hydrocephalus	1	6
Contracted pelvis	1			

Fetal mortality occurred in 7 per cent of cases, which include eleven stillbirths and six deaths following delivery. The corrected mortality of infants viable at birth was 2.45 per cent.

The fetal mortality in cases of ruptured uterus was 75 per cent, in placenta previa 25 per cent, and in eclampsia 21 per cent.

ANESTHESIA

TABLE VI. ANESTHESIA MORTALITY

TYPE OF ANESTHESIA	NUMBER OF CASES	DEATHS	PER CENT OF MORTALITY
Ethylene plus oxygen	172	7	4.1
Nitrous oxide plus oxygen	38	1	2.6
Ether	21	1	4.8
Spinal	6	2	33.3
Avertin	1	0	0.0

Inhalation anesthesia was employed in nine of the eleven cases in which death was attributed to anesthesia. Spinal anesthesia was directly responsible for the death of one patient who died before the operation was begun. In the other case in which death followed spinal anesthesia the death was not in any way attributed to the anesthesia.

CONCLUSIONS

1. Cesarean section is a conservative surgical procedure providing the indications are adequate and the operator is skilled.
2. The mortality rate shows a definite increase with each succeeding cesarean section.
3. Peritonitis, usually the result of preoperative contamination of the lower birth canal, is the most common cause of death.
4. The prenatal care of all pregnant women should include a consideration of the possibility that cesarean section might be required at the termination of pregnancy.

NOTE: The author wishes to express his thanks to Doctors E. R. Arn, R. C. Austin, B. W. Beatty, L. G. Bowers, R. A. Bunn, F. D. Crowl, R. K. Finley, G. C. Gillfillen, Curtis Ginn, H. H. Hatcher, H. H. Herman, J. K. Hoerner, E. M. Huston, H. R. Huston, M.D. Prugh, W. A. Ricketts, F. L. Silvely, F. I. Shroyer, C. S. Smith, and R. H. Spittler for their kind permission to include in this study the records of patients admitted to the Miami Valley Hospital.

FIDELITY BUILDING

FIBROMYOMA OF THE CERVIX UTERI*

REPORT OF CASE

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TRUE fibromyomas are occasionally seen arising from the cervix uteri that are of surgical significance.

Kolb found 5 (0.96 per cent) such tumors in a series of 552 cases of uterine fibromyomas. Boyd said that about 8 per cent of fibromyomas occur in the cervix. He also added that such cervical tumors were always single. According to Christopher, Bland-Sutton expressed the opinion that 5 per cent of all fibromyomas occur in the cervix. However, Vila and Schlossberg said that Schroeder gave the incidence as being 8 per cent, while Lee said that it was 15.5 per cent. Vila and Schlossberg in a series of 422 cases in which the uterus had been removed for multiple fibromyomas found only three (0.71 per cent) instances in which the cervix contained fibromyomas. Moench believed that 8 per cent of uterine fibromyomas occur also in the cervix. Turunen reported that 480 uterine fibromyomas were encountered at the gynecologic clinic at Helsingfors between 1919 and 1928, but that only two (0.42 per cent) of these occurred in the peritovaginalis. He said that Garkish found 1 per cent of uterine fibromyomas present in the cervix, while Albrecht, in 1928, found two cervical tumors among 700 specimens of uterine fibromyoma. Counsellor, Cox, Church and Paterson said that cervical fibromyomas may be found in 6 per cent of all diseased uteri which are removed surgically.

The literature on this subject is limited and consists primarily of isolated reports of cases. Turunen, in 1930, presented the only adequate review of the literature. He was able to collect 112 cases of fibromyomas of the uterine cervix and forty of these were first encountered when the tumor either blocked or rendered childbirth exceedingly difficult. He attributed the first report of a case to Langenbeck in 1859. Kolb, in 1910, found only twenty-four cases recorded in the literature and added five cases of his own, in one of which the tumor was responsible for an inversion of the uterus. Crousse, in 1922, described a huge tumor which measured 35 by 25 by 30 cm., and whose weight was 4,500 gm. Giles recounted an interesting case in which a large cervical fibromyoma had grown from the remaining cervical stump seven years after a subtotal abdominal hysterectomy had been performed for multiple uterine fibromyomas. The cervical tumor had rapidly filled the pelvis and had required prompt surgical removal. Moench also recorded a similar case in which the cervical tumor had appeared six weeks after operation for removal of another tumor. Solomons described the origin of a similar cervical tumor from the old scar in the anterior wall of the cervix, which marked an attempt to cure a sterility by dilating the ostia of the tubes from the vaginal route, which had been made several years previously.

Whitehouse²¹ and Frommolt^{8, 9} reported cervical tumors which were the cause of almost fatal vaginal hemorrhages. The case, which was reported by Hall, was remarkable because the tumor was so large that it filled the vagina and spread the

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vulva apart for a distance of 5 cm. Von Zur-Mühlen mentioned a similar case in which the cervical fibromyoma actually protruded from the vulva and the external portion measured 12 by 20 cm. The tumor in the case, which was reported by Kleff, was believed to have been a predisposing factor in the subsequent rupture of the uterus. Joseph, Zondek and Freund described an instance of a woman, aged thirty years, who had a cervical fibromyoma that blocked labor. Lehmacher reported two cases in which the tumors were intimately adherent to the bladder and hence were removed surgically with great difficulty. Courty, in 1932, recorded the instance of a large tumor, which arose from the posterior lip of the cervix and which was adequately treated by a total abdominal hysterectomy. The tumor in the case, which was recorded by Counseller, Cox, Church and Paterson, was pedunculated, derived from the submucosa, measured 6 by 7 cm., weighed 230 gm., and was easily removed by local excision of the pedicle, followed by a perineorrhaphy. They said that Reel had previously described the largest cervical fibromyoma; it had pushed the fundus of the uterus cephalad as far as the level of the umbilicus and had weighed 7,000 gm. (15.4 pounds).

The factors responsible for the causation of cervical fibromyoma are not accurately known. These tumors commonly affect multiparas, but may not be discovered until they interfere with the course of labor. However, more commonly they occur at or soon after the menopause. Their first warning sign is frequently the appearance of a sudden large, often alarming, vaginal hemorrhage. The interstitial type of tumor frequently fills the pelvis, obstructing in varying degrees, the urethra, bladder, ureters, rectum, sigmoid flexure, and the birth canal. Neighboring structures in the pelvis may become densely adherent to the fibromyoma, making the surgical removal of the tumor both very difficult and exceedingly dangerous. Cervical fibromyomas may undergo degeneration, secondary infection or sarcomatous changes. Cabot² records a case in which a woman, who had a large cervical fibromyoma, also had an accompanying purulent streptococcic pelvic phlebitis.

Local removal of either the smaller interstitial or pedunculated subserous types of tumor through the vagina may be done sometimes with ease and safety. However, large interstitial tumors require an intra-abdominal approach, and total abdominal hysterectomy is usually the treatment of choice. Radium or roentgenotherapy may cause a temporary shrinkage in the size of the tumor, but should rarely be allowed to supplant adequate surgical removal. Cases which have been reported by Giles, Moench, as well as our case, amply support this contention. Fibromyomas of the uterine cervix appear to arise from either the anterior or the posterior lip of the cervix. Usually, these tumors are difficult to remove surgically and require the services of an experienced gynecologist to insure a favorable result. The reported operative mortality is around 8 per cent, while the postoperative morbidity is an appreciable factor.

The following is a brief report of a case of a large fibromyoma of the uterine cervix which was successfully removed surgically.

REPORT OF CASE

A married Canadian woman, aged forty-nine years, was referred to the Mayo Clinic by her home physician because of a steadily enlarging mass in the lower uterine segment. She registered at the clinic on December 10, 1934. The family and past histories did not reveal anything important. There had been no previous operations. She had been well until two and a half years ago when she had had a marked vaginal hemorrhage. For the next six months she had had irregular menstrual periods which had been accompanied by "hot flashes" and small additional vaginal hemorrhages. Two years ago she had gone to her home physician for advice. He had performed a dilatation and curettage, which had failed to disclose any malignant changes. This had been followed by a course of roentgenotherapy. One

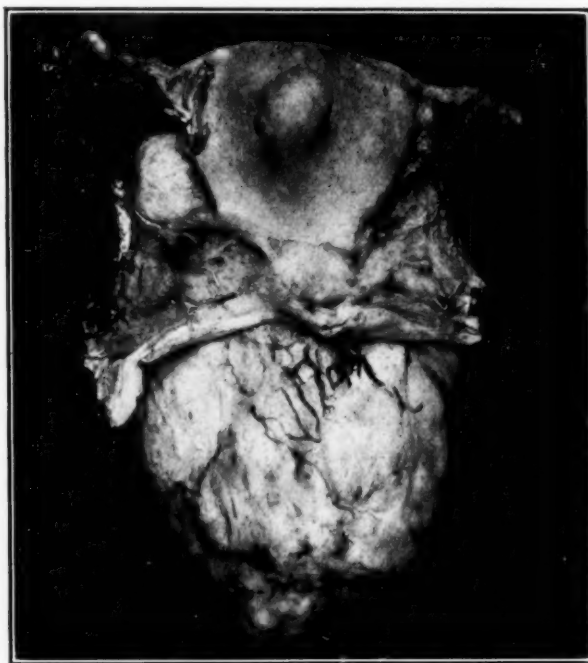


Fig. 1.—Anterior surface of uterus, tubes, and ovaries. It will be noted that the uterus sits on top of the cervical fibromyoma. The tumor can be seen emerging behind the greatly thinned anterior lip of the cervix and extending 11 cm. into the vagina.

month later she had had another severe hemorrhage. She had then been free from symptoms for the next six months, at the end of which additional vaginal bleeding had recurred. A second course of roentgenotherapy had been given at this time and she again had been well for five months. Since then, intermittent severe vaginal hemorrhages had occurred about every two months up to the time of her registration at the clinic. A third course of roentgenotherapy, together with the administration of calcium was given at home to prepare the patient for possible surgical treatment here.

Physical examination revealed a very obese woman who weighed 224 pounds (100 kg.) and who was 5 feet and 6 inches in height. There was extreme pallor of the skin. Soft blowing systolic murmurs were present at the mitral and aortic areas; they were not transmitted. There was a large firm mass in the lower part

of the abdomen. This was tender and extended to the level of the umbilicus. Vaginal examination disclosed a large mass which obscured the cervix. Rectal examination did not reveal anything abnormal. There were many large varicose veins and healed scars of old ulcers on the lower extremities.

The urine was alkaline in reaction and contained albumin 2 and leucocytes 1 (16 to each high-power field). The value for the hemoglobin was 9.5 gm. per 100 c.c. of blood. The erythrocytes numbered 3,980,000 and leucocytes 6,200 cells per cubic millimeter of blood. The Wassermann reaction of the blood was negative. Roentgenologic studies of the thorax revealed slight congestion of the base of the left lung.

On Dec. 11, 1934, the patient was operated upon. The abdomen was opened with a low midline incision. Multiple uterine fibromyomas, bilateral cystic oophoritis, bilateral chronic salpingitis, and a large fibromyoma of the cervix were discovered. The fibromyoma of the cervix measured 19 by 12 by 11 cm. (7.5 by 4.7 by 4.3 inches) and about half of it protruded through the external os. The patient also



Fig. 2.—Midsagittal section through uterus and huge fibromyoma of the uterine cervix, arising from the posterior lip.

had a chronic cholecystitis and cholelithiasis, but it was considered advisable to postpone cholecystectomy until a later date. The appendix was not disturbed. A total abdominal hysterectomy and a bilateral salpingo-oophorectomy were performed with considerable difficulty. Figs. 1 and 2 show the tissue which was removed.

The pathologist reported that the uterus weighed 2,095 gm. (4.6 pounds). The uterus contained multiple fibromyomas; the largest of these measured 19 by 12 by 11 cm. (7.5 by 4.7 by 4.3 inches), and the smallest measured 1 cm. (0.4 inch) in diameter. The largest tumor apparently had originated in the posterior lip of the cervix. It had produced a very marked dilatation of cervix, which was similar to that which occurs in a full-term pregnancy, and it had extended beyond the cervical lips for a distance of 11 cm. (4.3 inches). The tumor had encroached on the uterine cavity to the extent that the latter appeared only as a slit. There was atrophy of the tubes and ovaries.

The patient had an uneventful convalescence.

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TUBAL GESTATION

A STATISTICAL STUDY BASED ON 309 CASES

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IN REVIEWING 309 cases of ectopic pregnancy admitted to the Charity Hospital in New Orleans during the period from 1924 to 1934, the authors found that in this series there were 36 deaths in which the cause of death was directly attributable to this lesion. This mortality rate, 11.6 per cent, closely approximates the published mortality rate in acute appendicitis. Although acute appendicitis occurs much more frequently than ectopic gestation, certainly ectopic gestation carries just as high a mortality rate, and is invariably more difficult to diagnose. These incontrovertible facts prompted this study and analysis of cases. Before a study of this series was started, we were impressed, from the cases we had observed personally, with the fact that patients presenting the classical picture of ectopic gestation were greatly in the minority, and that the so-called atypical case was most frequently encountered.

That this idea was correct was borne out in the study of the present series. For this reason they were divided into an urgent group in which emergency operations were performed within the first twenty-four hours after the patient's admittance to the hospital, and a non-urgent group in which laparotomy was postponed until a later period.

One hundred thirty-three cases (43 per cent) fell under the caption of urgent cases, and 176 (57 per cent) under the grouping of nonurgent cases. In the urgent cases the preoperative diagnosis was ectopic gestation in 87 cases, or a correct preoperative diagnosis of 69.1 per cent, whereas in the remaining 46 cases the preoperative diagnosis was otherwise, usually acute appendicitis, or an error of 30.9 per cent. In the nonurgent group, 73 cases (41.2 per cent) were correctly diagnosed preoperatively, and 103 diagnosed incorrectly (58.8 per cent), the preoperative diagnosis varying from salpingitis to fibroids of the uterus.

We believe that the preoperative diagnosis of acute appendicitis in so many of the urgent cases can be attributed to the fact that in this series, in which the location of the pregnancy was definitely noted in 258 cases, 161 cases (62.4 per cent) were found to be in the right tube. The remaining 97 cases (37.6 per cent) were found in the left tube. This is not in accord with the conclusions drawn by Schumann,¹ from a study of cases reported by Castler, Farrar, Bovee, Frank, Foskett and Williams. However, we believe that the difference in this series is too great to be due to chance, and that ectopic gestation is most frequently found on the right side. No effort will be made to explain this difference, as any explanation would be purely hypothetical.

The authors are impressed by the large percentage of cases of salpingitis found, either microscopically or grossly, in this series. Eighty-five cases, or 27.8 per cent, showed microscopic evidence of tubal disease, while an additional 30 cases showed gross tubal disease in the uninvolved tube (9.7 per cent), giving a total of 37.5 per cent of tubal disease associated with ectopic pregnancy. This is in accord with the general observation of other authors that salpingitis is one of the most frequent etiologic factors in extrauterine pregnancy. Of late, reports have appeared in the literature of ectopic pregnancy following tubal insufflation, and we believe that such can be explained by a previous salpingitis, the insufflation merely reestablishing the lumen, so that conception can take place, but the peritubal adhesions and intramural changes are of such a nature that normal tubal peristalsis is interfered with and the lumen remains narrow enough to prevent the passage of a fertilized ovum.

The total number of cases reviewed is 309, with death in 36 cases, or a mortality of 11.6 per cent. Of the thirty-six patients that died, twenty-seven followed laparotomy, while nine patients died without surgical intervention. Autopsy in all nine of these cases showed massive intraperitoneal hemorrhage from ruptured ectopic pregnancy.

FATALITIES

1. Patient admitted, diagnosed as ruptured ectopic pregnancy, treated immediately for shock, but patient died before operation could be started. Autopsy, ruptured ectopic pregnancy.

2. Patient in hospital three days, apparently in good condition, waiting for donors so transfusion could precede operation. Died from sudden recurrent massive hemorrhage. No operation. Autopsy, ruptured ectopic pregnancy.

3. Patient admitted at 3 P.M., died at 8:30 P.M. same day. Admission diagnosis: Chronic salpingo-oophoritis, subacute appendicitis, secondary anemia. No operation. Autopsy, ruptured ectopic pregnancy.

4. Patient admitted with diagnosis of ruptured ectopic pregnancy, died two hours later during transfusion before operation could be started. Autopsy, ruptured ectopic pregnancy.

5. Patient admitted with diagnosis of chronic salpingo-oophoritis, possible ectopic pregnancy. Died four hours later. No operation. Autopsy, ruptured ectopic pregnancy.

6. Patient admitted with diagnosis of puerperal sepsis and bronchopneumonia. Died two days later. No operation. Autopsy showed ruptured right tubal pregnancy and bronchopneumonia.

7. Patient admitted with diagnosis of coronary thrombosis. Died three hours later. Autopsy, ruptured ectopic pregnancy.

8. Patient admitted with diagnosis of gastroenteritis. Died nineteen hours later. Autopsy, ruptured ectopic pregnancy, hemoperitoneum.

9. Patient admitted with diagnosis of possible ectopic pregnancy; possible pelvic abscess. Two days later developed cramps in the abdomen and died suddenly. Autopsy, ruptured ectopic pregnancy.

These cases illustrate that patients can and do die from ruptured ectopic pregnancy, as a result of massive intraperitoneal hemorrhage, and that there should be no "conservative" treatment in ectopic pregnancy.

CONCLUSIONS

1. The mortality rate in ectopic pregnancy closely approximates the mortality rate of acute appendicitis.

2. Ectopic gestation occurs more frequently in the right tube than in the left tube.

3. The diagnosis of ectopic pregnancy, ruptured and unruptured, is exceedingly difficult, due to the large number of atypical cases encountered.

4. Salpingitis is one of the most frequent etiologic factors in ectopic pregnancy.

5. There should be no conservative treatment followed in ectopic pregnancy. Immediate operation as soon as the diagnosis is established, and the shock from hemorrhage combated, is the only safe treatment.

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MELANOMA OF THE URETHRA*

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MELANOMA is an uncommon, highly malignant, generally pigmented neoplasm, arising usually from the choroid coat of the eye or pigmented nevi of the skin. Melanomas of the meninges, rectum, adrenal, and vulva are on record. Origin from the region of the external orifice of the female urethra is a most unusual site and warrants report of this case.

A search of the literature revealed four similar cases,^{1, 2, 3, 4} but cursory mention of melanoma of the urethra was noted in two large reported series of melanomas.^{5, 6}

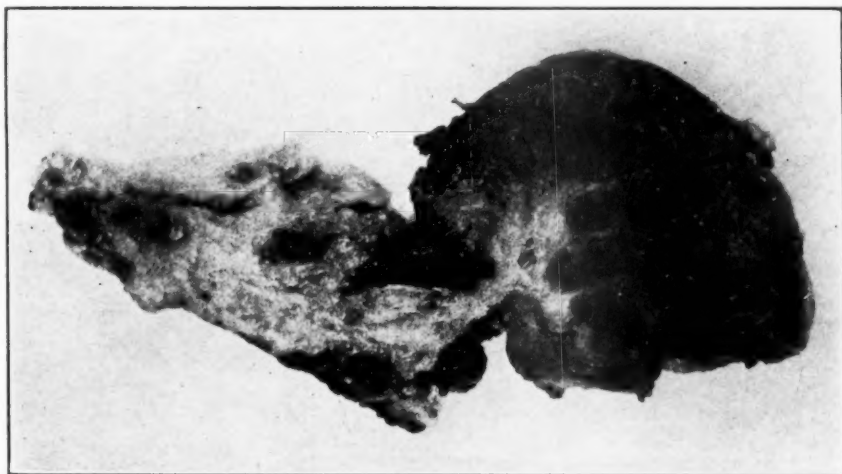


Fig. 1.—Sagittal section of the gross specimen. The pale pedicle, derived from the urethra, shows irregular darker areas. The main mass is the tumor proper. It is compact, dark and is invaded by branches from the pale central stromal core.

In one of these⁴ it is doubtful whether the melanoma was primary in the urethra. Our observations together with those noted in the literature show this peculiar tumor to have the following characteristics:

1. It occurs in the aged. The average age for the five cases is seventy years, the youngest sixty-four years and the oldest seventy-five years.
2. Vaginal discharge and urinary symptoms occur but are not constant. In three cases a bloody discharge was observed, in two, dysuria was present, and two patients noted the presence of the tumor.
3. In every instance the tumor arose from a portion of or the entire tissue surrounding the external orifice of the urethra. Yet in no case was there complete urinary obstruction. In only one instance was the urinary stream diverted.

Miss K. F., a seventy-five-year-old spinster, was admitted on Jan. 7, 1935, to the Gynecological Service of The Long Island College Hospital. The patient first noted

*Read before the Brooklyn Gynecological Society, March 1, 1935.

a foul-smelling, coffee-colored mucoid vaginal discharge about six weeks prior to admission. Within a few days this became grossly bloody. Two weeks later a brother noted that she did not appear well. Her weight decreased from 97 to 90 pounds. She also had a slight cough.

On examination she appeared senile, emaciated, but not acutely ill. Her vision was good and no abnormalities were noted in the fundi, except for the vascular changes characteristic of senility. The chest was emphysematous, the heart slightly enlarged, and the spine moderately scoliotic. The liver was not palpable. A pink, pedunculated verrucous growth, measuring $1\frac{1}{2}$ cm. in diameter was noted on the skin in the region of the left lower abdomen, and a firm, almond-sized lymph node was revealed on deep palpation in the left inguinal region. Several other smaller nonpigmented verrucous growths of the skin and hemangiomas were also observed.

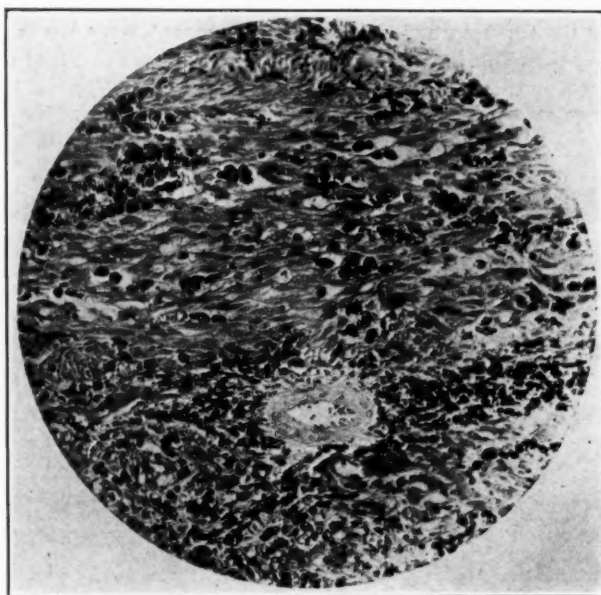


Fig. 2.—Spindle-shaped cells resembling sarcoma are seen. Adventitial cells surrounding the blood vessel are loaded with melanin pigment. (X200.)

The laboratory findings were essentially negative. Roentgen examination of the chest and bones showed no evidence of metastases.

A satisfactory pelvic examination could not be made until the patient was narcotized with morphine and scopolamine in preparation for the operation. At this time an irregular pedunculated cauliflower growth, $3\frac{1}{2}$ cm. in diameter, was seen arising from the region of the urethral orifice. Externally the friable tumor was purple-black in color. After inserting a glass catheter into the bladder, the mass was seen to arise from the region of the external orifice of the urethra and not from the mucosa of the vestibule. This was further proved by traction on the growth which revealed its attachment to the terminal portion of the urethra. Rectal examination disclosed the cervix to be posterior and mobile. The uterus was atrophic and the adnexa and parametria were not palpable.

On Jan. 10, 1935, under morphine scopolamine narcosis and local anesthesia, the mass was excised with an electrocautery. The postoperative course was essentially

uneventful. She was out of bed on the ninth day and home on the seventeenth day. Examination at the time of discharge showed a granulating wound. A follow-up report on Feb. 25, 1935, revealed the patient to be feeling well. There were no urinary symptoms nor recurrence of her vaginal discharge and bleeding.

Pathologic Report.—The specimen consisted of an irregular tissue fragment which measured 32 by 26 by 15 mm. and was necrotic in portions. The main mass was lobulated and bluish-black. The pedicle was greyish-white and showed small irregular darker areas. On section, a pale central stromal core was observed to arise from the pedicle. This was subdivided into small branches which penetrated the main mass in all directions.

Microscopic Examination.—The sections revealed the tumor and an adjacent segment of urethra. The latter was normal except for focal hyperkeratosis. The tumor mass was comprised of groups of malignant spindle and polygonal cells separated

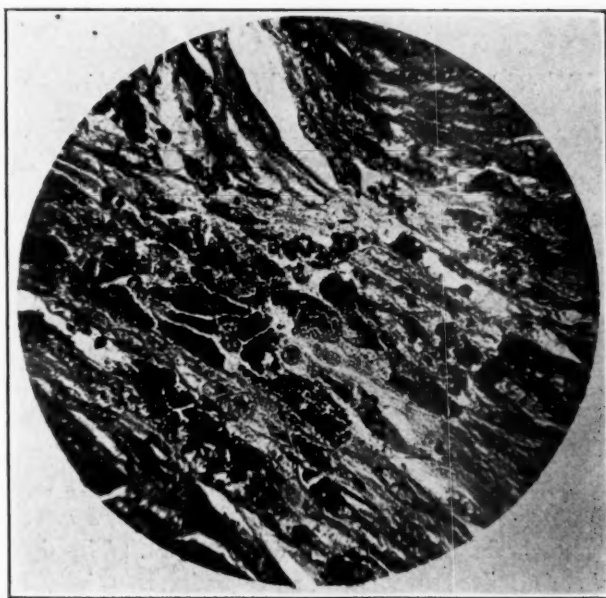


Fig. 3.—The large spindle and polygonal malignant cells show many granules of pigment in their cytoplasm. (X800.)

into irregular alveoli by narrow strands of hyalinized connective tissue. The malignant cells presented a poorly defined cell membrane and an elongated nucleus with a fine chromatin network. In the connective tissue septa, round and oval cells carried deposits of melanin pigment. The pigment was irregularly arranged in coarse round granules which in some areas were massed together. In many of the cells of the tumor proper, pigment deposits were also seen. A diagnosis of melanosarcoma was made, and further confirmed by excluding hemosiderin pigment and by the bleaching test.

Melanomas of the vulva have been reported much more frequently. In 1920, Kehrer⁷ collected 83 cases from the literature. Their average age was fifty-four years. In these patients the clinical course was characterized by ulceration, lymphatic involvement and occasionally, widespread metastases. Since the external orifice of the urethra has somewhat the same anatomic relations as the clitoris and labia

minora, from which many of the tumors collected by Kehrer arose, we might expect a similar picture in our patient. Her senility, however, may be a factor in retarding the activity of the growth.

I am indebted to Dr. B. A. Harris for his kind permission to report this case and to Dr. S. A. Wolfe for his aid in the study of the pathology of this interesting tumor.

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350 HENRY STREET

INTRAVENOUS ANESTHESIA WITH EVIPAL SOLUBLE*

ALBERT HOLMAN, M.D., AND ALBERT MATHIEU, M.D., PORTLAND, ORE.

WE WISH to report the use of "Evipal Soluble" as an intravenous anesthetic in one hundred gynecologic patients. Forty-six of these were private patients and fifty-four were from the gynecologic service of one of us (M) at the Multnomah County Hospital.

Evipal soluble is the sodium salt of N-methyl-cyclohexenyl-methyl-malonyl-urea. It is supplied as a powder in ampules containing 1 gm. accompanied by an ampule of 10 c.c. of distilled water in which the powder is to be dissolved shortly before use. When administered intravenously, evipal soluble has an extremely rapid effect, and since it is not a volatile substance, the anesthetic must be defined as uncontrollable. However, the detoxication proceeds so rapidly that it approaches closely controllable anesthesia in the ebbing of its effect. The detoxication is due to its chemical decomposition in the body, especially in the liver. The lethal dose has been determined to be from three to four times the full anesthetic dose. Surgical anesthesia is produced very rapidly.

ADMINISTRATION AND DOSAGE

Evipal soluble is administered intravenously, preferably in the median basilic vein. No preliminary medication is necessary. The recommended dose is 1 c.c. of a 10 per cent solution (obtained by dissolving 1 gm. of the drug in 10 c.c. of distilled water) for each 16.6 pounds, with a maximum dose of 10 c.c. at one time. The length of the contemplated operation affects to some extent the amount of the drug to be administered.

Evipal soluble has been used extensively in Europe, and many writers have reported large series of cases without fatalities. A total of these reported cases amounts to over 50,000, and in only one of these could the death be attributed to the drug. The British Medical Research Council has made an extremely favorable report on the safety of evipal soluble.

*Submitted for publication, February 6, 1935.

LIST OF OPERATIONS

Vaginal examination under anesthesia	7	Cauterization of Bartholinian gland	7
Dilatation of cervix	5	Cystoscopy and pyelogram	1
Curettage	40	Rectal abscess	1
Therapeutic abortion	6	Dilatation of rectum	2
Cauterization of cervix, cysts, and polyps	10	Hemorrhoidectomy	1
Excision of rectal fistula	3	Needling culdesac and colpotomy	5
Excision of rectal ulcer	5	Salpingectomy and suspension of uterus and appendectomy	1
Incision and suture of perineum	1	Removal of large tumor from labia with cautery	1
Perineal repair	1	Cautery vaginal wall cyst	1
Cauterization of venereal warts	3	Removal of vaginal septum	1
Simple amputation of breast	1	Urethral fibroma	1
Breast abscess	1	Cautery Skene's glands	1
Biopsy	4		
Separation of adhesions about clitoris	1		

Eleven patients had more than one operation.

It has been advised that from one and one-half to two minutes be taken for the injection, but it was our experience that anesthesia occurred more quickly and seemed to last longer if the drug was given at a more rapid rate. As our experience with the drug progressed, the time occupied in the injection became shorter, and we feel at present that thirty seconds is the best length of time to use in injecting the solution. It is important that the jaw be supported during the injection and while the patient is asleep. We instructed many of our patients to count slowly, and we found that they stopped counting and were asleep in from twelve to twenty-five seconds. The rapidity of the anesthetic effect seemed to depend upon the rapidity of the injection. The anesthetic effect lasted from ten to fifteen minutes, depending upon the amount of the drug administered and on the speed with which it was given. At times we injected the optimum amount, and then later, if the operation took longer than had been anticipated, we injected another 2 or 3 c.c. at the first sign of movement.

Blood pressure readings were taken preoperatively and five, ten, and fifteen minutes after the injection; and it was our experience that the majority of patients showed a moderate drop in both the systolic and the diastolic pressure in five minutes with a gradual return to the preoperative level. The pulse was recorded at the same interval, and most of the patients showed a moderate increase of rate at the end of five minutes. This gradually dropped to the preoperative rate. The respirations became slower and deeper.

The pupils became widely dilated by the time the injection was completed and responded to light in about seven to ten minutes. Seven of the one hundred patients were somewhat nauseated upon awakening and of these, four vomited. Vomiting was avoided if the injection was given to the patient when the stomach was empty.

As a rule, the patients aroused, that is, began to move, in from ten to twenty minutes and were awake in from fifteen to thirty minutes; however, these patients were variable in conduct. Some awakened in a shorter time, and an occasional patient slept longer than thirty minutes. Most of the patients operated upon in the office were able to leave in from one and one-half to two hours, but were somewhat sleepy during the remainder of the day.

One operation, consisting of salpingectomy, suspension of the uterus and appendectomy, was commenced with the patient under evipal soluble anesthesia. At the end of fourteen minutes, the administration of nitrous oxide was begun and continued throughout the remainder of the operation. The blending of the two anesthetics was smooth, and very little of the gas was required to complete the operation.

When they awakened, several of our patients did not believe that they had been asleep or that the operation had been performed. We mention this to demonstrate the amnesic effect of the drug. Most patients seemed to awaken in the same state of mind as that in which they went to sleep. If they were nervous and excitable before the injection, they awakened nervous and excitable. For this reason, we found that it was advisable to reassure the patient and to establish composure before the evipal soluble was injected. A number of the patients who were instructed to count during the injection and who went to sleep counting, continued to count when they awakened, starting where they had left off upon losing consciousness. Patients seemed to awaken more tranquilly if they were left alone and not disturbed. The effect of evipal soluble seems to be such that a period of time lasting from ten to thirty minutes was removed from the patients' consciousness, during which time there was complete surgical anesthesia and amnesia without any exciting or untoward effect.

CONTRAINDICATIONS

Contraindications to evipal soluble narcosis have not been established to date. It is obvious that aged, cachectic, debilitated, and seriously ill patients, and those suffering with severe circulatory or respiratory diseases should be treated with the necessary individual caution. Since evipal soluble is detoxified in the liver, special caution should be observed in its use when there is liver damage. As one would suspect, the narcosis would be prolonged.

CONCLUSIONS

In evipal soluble anesthesia we have an intravenous anesthetic of real value, which has been completely satisfactory in our hands. It gives surgical anesthesia and absolute relaxation for a period of time varying from ten to fifteen minutes. This anesthesia and relaxation can be continued for several minutes longer by the additional injection of 2 or 3 c.c. of the solution. The anesthesia is so profound that the abdomen may be opened or the rectal sphincter dilated. Any simple laparotomy not requiring more than twenty minutes can be done with this anesthetic, if, at the end of ten or twelve minutes, an additional 2 or 3 c.c. of evipal soluble are injected. We suggest this anesthetic as an especially good one for short operations on tuberculous patients. We experienced no disagreeable or dangerous effects in our series of one hundred cases, and we heartily recommend it as the anesthetic of choice for most surgical operations that can be done within fifteen minutes.

ROUTINE TREATMENT OF GONORRHEA IN FEMALES

NONANTISEPTIC METHOD

BERNARD NOTES, M.D., WASHINGTON, D. C.

(From The Department of Obstetrics & Gynecology, School of Medicine, The George Washington University, and The Social Hygiene Clinic, Health Department of the District of Columbia)

THE negativistic policy of some public health officials who hold that gonorrhea is often a self-limited disease of short duration, and the unphysiologic therapeutic attitude of many practitioners, warrants this analysis of the good results obtained during a period of eighteen months by a combination of methods based on an understanding of the anatomy, physiology and pathology of the female generative tract, with its variations during the whole life of the female.

The following is generally held by gynecologists:¹ (a) the fountain-head focus is in the cervix; (b) the next most important focus is in the urethra (Skene's ducts and paraurethral ducts) which is lined by resistant stratified squamous or transitional epithelium; (c) the vagina, during the reproductive period, suffers only transiently; and (d) the upper genital tract tends to resolve itself of infection if relieved of the reinfection and constant drainage from the lower genital tract.

This analysis covers the work of the Gynecological Section, Social Hygiene Clinic of the Health Department of the District of Columbia during the past four years, but particularly the last eighteen months. During this period 2,129 new positive cases of gonorrhea of the female genitalia were admitted for treatment. Obviously, the usual difficulties attendant upon a City Social Hygiene Clinic along lines of continuity of treatment and follow-up were encountered due to the type of patient.

Positive diagnosis was based on smears with gram-negative intracellular diplococci having the morphology of the gonococcus, plus objective clinical signs. While not taken as diagnostic, extracellular gram-negative diplococci were considered as suspicious, and no patient was discharged as recovered who had these suspicious smears. In order to discharge a patient as cured, four consecutive smears negative for both intra- and extracellular gram-negative diplococci obtained at intervals of two weeks with absence of objective clinical signs was required. Thus each patient was observed two months for recurrences.

The basis of treatment in the beginning was drainage and antisepsis. In 1931 antiseptics used in treatment included iodine and lysol, as douches and by topical applications, and of 384 cases admitted, four were discharged, 1 per cent. In 1932 antiseptics used included iodine,

lysol, mereurochrome and silver nitrate (10 per cent) and of 522 patients admitted, 18 were discharged, 3.4 per cent. In 1933 of 546 cases admitted, 48 were discharged, 8.7 per cent. In August, 1933, the direction of this particular phase of venereal disease work was put in the hands of a gynecologist. Treatment on the bases of creation of local reaction and drainage with the omission of antiseptics was begun as follows: (a) all cervixes with cervical glands functioning² were cauterized one or more times with the electrocautery at intervals of two or more months in order to cause local reaction and to give better drainage of the active focus; (b) urethral meatus and cervix were treated weekly with applicators saturated with 25 per cent silver nitrate (considered a local irritant, not an antiseptic, in this strength) in order to cause local reaction and to favor better drainage; (c) 5 per cent sodium-bicarbonate douches were

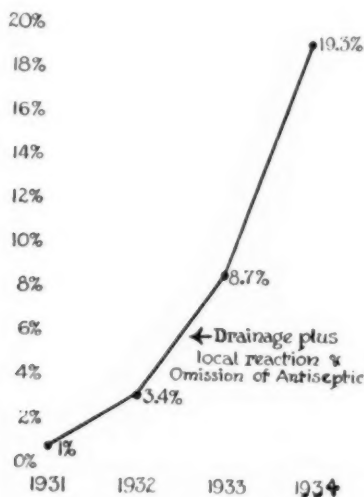


Fig. 1.—Showing effect of treatment in percentages.

taken by the patient at home twice daily, by fountain syringe until the cervix healed and by pressure syringe (bulb type) after the cervix healed; and (d) nightly instillations of 1 dram of 1 per cent lactic acid jelly were made by nozzle to the vaginal vault in order to promote the normal bacterial flora and to get rid of secondary invaders which cause desquamative vaginitis. During the first six months of this period, but twelve patients were discharged; however, clinical improvement and increase in negative smears were marked. Beginning with February, 1934, sustained results began to be obtained, and of 677 cases admitted during the following twelve-month period, 131 were discharged, 19.3 per cent. In other words, in 1931, 1932, and 1933 combined, but 110 were discharged as against 131 for 1934 alone.

Ages of patients ranged from a few weeks to sixty years, the average being nineteen years of age. Approximately one-half had syphilis which

was under active treatment. The largest number of cauterizations upon a single patient was 5, the smallest 1, and the average 2. Total number of cauterizations during the eighteen-month period was 786. Some cases which had resisted treatment by antiseptics for as long as four years were cured within one year by creation of local reaction and drainage. No patient who cooperated failed of cure.

Complications such as pelvic peritonitis and hemorrhage were at times severe but at no time dangerous; and these did not develop often. Patients were prepared for these reactions by a thorough explanation of what was being done, why, and what was to be expected. Occasional incomplete stenosis of the cervix developed as was expected but no cases of hematometra. One abortion occurred in an early pregnancy which was not diagnosed at the time of electrocauterization of the cervix, but good recovery resulted.

CONCLUSIONS

1. Antiseptics should be abandoned in the treatment of gonorrhea in females.
2. Cure lies in a physiologic-pathologic approach and consists mainly of creation of local reaction and drainage.

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1801 EYE STREET, NORTHWEST

Burch, Phelps, and Wolfe: Endometrial Hyperplasia, Arch. Path. 17: 799, 1934.

The authors particularly call attention to a method of diagnosis previously described by the senior author. This consists in removal of endometrial tissue for histologic study by a "punch" and suction and, in their belief, is superior to curettage. Serial sections from several areas in the endometrium, taken as near the onset of menstrual bleeding as possible, reveal very interesting information.

A fungus appearance of the endometrium must be differentiated from carcinoma. These studies, as verified by others, seem to show that there is no tendency for the lesion to merge into carcinoma. Hyperplasia may occur at any time of life; it is more frequent at or near the menopause. Vaginal bleeding is the chief symptom. The lesion must be further differentiated from abortion, fibroid, unruptured ectopic pregnancy and luteal polymenorrhea. Careful history and physical examination will often lead to correct diagnosis. The prognosis of the disease as regards life is good; although some fatal cases have been reported. Pregnancy may occur after a spontaneous recovery. The disease is amenable to treatment with hormones, radiotherapy, curettage, or hysterectomy. Anterior pituitary hormones give encouraging results. Parathyroid extract (Collip) has been useful in some cases. Radium and roentgen rays are very useful near the menopause. In young patients curettage should be repeated before a more radical form of treatment is instituted.

W. B. SERBIN.

OBSERVATIONS ON THE NORMAL SEX RATIO OF ALBINO RATS AND THEIR ARTIFICIAL VARIATION

MIHRAN A. VARZHABEDIAN, M.D., CHICAGO, ILL.

THE following theoretical outline has been taken as a working basis for the experiments performed:

1. That chromosomes of the sperms are the determinants of sex.
2. That sperms are of two kinds, one containing the X element and one without the X element.
3. The sperm with the X element uniting with the ovum having its constant X element, produces a female while ova uniting with sperms without the X element produce males.
4. The action of the X element is quantitative.

Taking the above points which were brought out by Prof. E. B. Wilson of Columbia as a foundation and assuming that the quantitative increase in the chromosomes is closely related to the physiologic activity of the organism in general and the sex organs in particular, I have utilized depressants for the production of chromosomes without the X element and stimulants to produce chromosomes with the X element for the production of males and females, respectively.

The experiments have been carried out on the following plan: The male rats have been kept in separate cages and gradually saturated with the medication desired for varying periods from two weeks to ten weeks, then mated with the females and after impregnation the females segregated in individual cages and the litters checked and recorded. It has been observed that there is a definite increase of the desired sex in the litter if the male has been kept saturated with the medication longer.

The normal sex ratio of the albino rat, as quoted by Richard Goldschmidt in his book on *The Mechanism and Physiology of Sex Determination*, is 100 females to 105 males, there being a slight increase of females during the summer months and of males in the winter.

The experiments were started during December, 1927, and have been followed at varying periods depending upon the facilities at hand. The medication used included the bromides for the male experiments and thyroid, pituitary and testicular extract combinations for the female experiments. All rats under observation were fed the same mixtures of different food elements.

The following results have been observed in the experiments performed in the first series. A new series is at present started in the Pathological Laboratory of the Martha Washington Hospital.

TABLE I*

MEDICATION	PARENTS		DATE OF BIRTH	LITTER	RATIO M. F.	LENGTH OF MEDICATION
	M.	F.				Days
M	A	E	March 16, 1928	6	5 - 1	21
M	A	E	May 5, 1928	8	6 - 2	21
F	A	E	June 20, 1928	7	1 - 6	28
F	C	F	March 22, 1928	9	2 - 7	21
M	C	F	May 8, 1928	9	7 - 2	28
M	C	F	July 4, 1928	9	8 - 1	21
F	C	F	Aug. 2, 1928	13	6 - 7	15
F	G	H	July 25, 1928	6	2 - 4	15
M	G	H	Oct. 4, 1928	6	5 - 1	28
F	X	Y	May 18, 1929	7	1 - 6	26
M	X	Y	July 31, 1929	8	6 - 2	30
M	V	W	May 22, 1929	6	4 - 2	26
F	V	W	Aug. 1, 1929	9	2 - 7	30
M†	O	P	July 13, 1929	8	8 - 0	10 weeks

*The letters in the first column indicate the medication used, M for male, showing that the male rat has been fed so as to produce more males in the litter and F for females.

The second column shows the parents used in the experiments.

The third column gives the date of birth of the litter.

The fourth gives the total in the litter.

The fifth gives the ratio of the sexes in the litter.

The sixth shows the length of medication of the male rat.

†The feeding of this male rat was started when he was yet three weeks old and continued until maturity when he was mated with his litter mate. The result gave 8 males with no females in the litter. It will be noted that the shorter the period of feeding of the male the closer to the normal ratio of the sexes in the litter. The rest of the experiments have been for males or for females directly without using the same pairs for shifting the ratio. The male experiments with the use of the bromides have given uniformly satisfactory results. The influence of season and diet has made no change in the proportion. In the direct experiments with the stimulants for the increase of females in the litter the results have not been as high as in the male experiments, the total ratios standing 62F:28M for the female experiments and 87M:29F for the male side, total number of litters obtained to date being 37.

The figures in Table I are given as observed without any comment.

2700 DEVON AVENUE

Mazza and de la Colina: Hydatidiform Mole and Chorionepithelioma, Bol. Soc. de obst. y ginec. 13: 677, 1934.

The authors report three cases, one of hydatidiform mole, one of chorionepithelioma, and one of doubtful clinical entity, diagnosed by the use of the biologic test of Aschheim and Zondek used in minute doses. These cases were followed up with the same technic for evidences of recurrence.

MARIO A. CASTALLO,

A SIMPLE ROENTGENOGRAPHIC METHOD FOR ACCURATELY
DETERMINING THE TRUE CONJUGATE DIAMETER
OF THE PELVIS

SAMUEL F. WEITZNER, M.D., NEW YORK, N. Y.

(From the Morrisania City and Lebanon Hospitals)

THE purpose of this paper is to describe a new method of measuring accurately the true conjugate diameter of the pelvis by means of a simple roentgenographic procedure. To the best of my knowledge this procedure has not been described previously. Other roentgenographic methods have proved very successful in the hands of a limited number of physicians skilled in their use, but probably the reason that no method has been universally adopted is because it requires either a special technic difficult to master or additional expensive equipment. The method proposed is a very simple one requiring but one x-ray exposure and will afford an accurate measurement of the true conjugate. Physical examination can usually be relied upon to furnish all the data necessary for the estimation of the outlet.

There are two factors essential:

1. An unquestionable demonstration on the film of the points to be measured.
2. A method of measuring the distance between these points, taking into consideration the distortion caused by the object-film distance.

The best means of demonstrating both the promontory of the sacrum and the posterior surface of the symphysis pubis is by a lateral projection on a properly exposed x-ray film. The promontory of the sacrum cannot be demonstrated nearly as well on an anteroposterior film, even by the stereoscopic method.

In searching for a method of measuring the distortion of the conjugate diameter, it occurred to me that by placing an accurately graduated, metal ruler in the same plane as the conjugate diameter of the pelvis, the distortion on the film of the conjugate diameter would be equal to the distortion of the metal ruler regardless of the distance of the tube or pelvis from the film.

The metal ruler used for the purpose described above is a piece of $\frac{3}{4}$ -inch brass tubing on which have been cut, by a threading machine, eight threads to each inch. This can be made by any plumber or mechanic. Brass has proved to be the most satisfactory metal for this purpose.

METHOD OF PROCEDURE

1. Attach the metal ruler to the patient's back with strips of adhesive so that it lies over the spinous processes of the lumbar spine and sacrum in an absolutely vertical position. The lower end of the ruler lies in the cleft between the buttocks.
2. Place the patient laterally on the Potter-Bucky diaphragm. Make an accurate lateral exposure of the lumbar spine and pelvis centering the tube over the greater trochanter of the femur. Special attention is paid to the posture of the patient so that a true lateral projection is obtained. One should be able to demonstrate on the film the promontory of the sacrum and the symphysis pubis.
3. On the film measure the distance between the promontory of the sacrum and the upper border of the posterior surface of the symphysis pubis.
4. Lay off this distance on the shadow of the metal ruler.



Fig. 1.

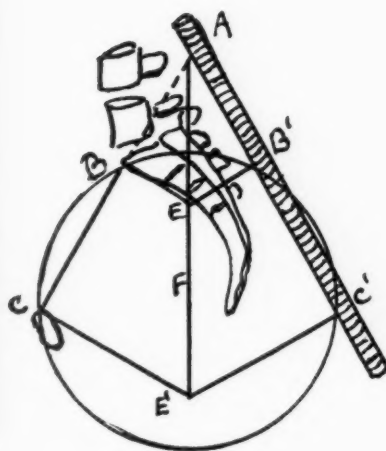


Fig. 2.

Fig. 1.—Illustrating the position of pelvis and ruler in this method of measuring the true conjugate diameter. (Dried specimen.)

Fig. 2.—Triangle $AE'C'$ is congruent to triangle $AE'C$ since they are right triangles with hypotenuse and one angle equal. (Angle at A.) Similarly triangle AEB' and triangle AEB are equal. In congruent triangles, corresponding sides are equal. Therefore: AB' equals AB . AC' equals AC and, subtracting equals from equals, $B'C'$ equals BC .

5. Count the number of notches included in this distance. Convert the number of notches into inches by dividing by 8, since each notch represents one-eighth of an inch. If desired, this measurement can be easily converted into centimeters. I intend to have a ruler constructed on which the graduations will be measured in centimeters.

To prove the accuracy of this method, I measured several metallic objects at various distances from the film. These measurements were invariably accurate. I have also measured the true conjugate diameter of several dried pelvises and in each instance the roentgen measure-

ments corresponded exactly to those obtained by manual measurement of each pelvis.

This method has been applied very successfully in the Obstetrical Service at Morrisania City Hospital and I am now engaged in compil-

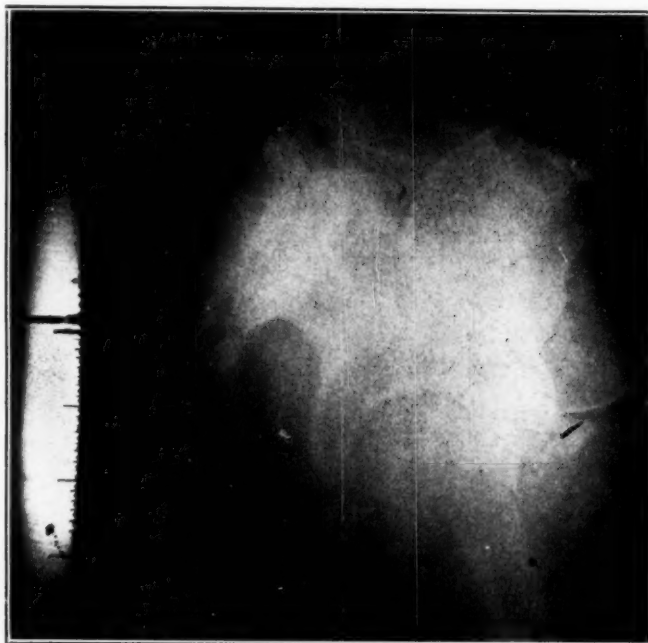


FIG. 3.—Showing roentgenogram of pelvis at beginning of labor, with ruler in position.

ing the data, obtained from a large group of cases, which will show the relation between measurement of the true conjugate and the history of the delivery.

I wish to express my thanks for the kind encouragement of Dr. Harry Aranow, Director of Obstetrics, and also wish to acknowledge the assistance of Dr. M. Friedman and Mr. Henry Aranow, Jr.

1882 GRAND CONCOURSE

Davidson, C. L.: Twisted Ovarian Cyst. A Procedure to Prevent Fatality From Embolism, *Am. J. Surg.* 27: 79, 1935.

It has not been an uncommon thing for an operation for twisted ovarian cyst to terminate fatally by cerebral embolism. If the twisted cyst is not disturbed, but is delivered into the abdominal wound and a hemostat is placed well below the last twist on the broad ligament, that is, beyond any discoloration or hemorrhagic areas in the pedicle, this procedure will tend to prevent embolic terminations. It is felt that untwisting the cyst before amputation allows stagnated blood to get into circulation and thus cause embolism.

J. THORNWELL WITHERSPOON.

ABDOMINAL PREGNANCY WITH REMOVAL, AFTER
EIGHTEEN YEARS, OF A SIX MONTHS'
LITHOPEDION*

ADRIAN W. VOEGELIN, M.D., PHILADELPHIA, PA.

THE case about to be reported presents some interesting features. Mrs. H. S., aged fifty-two, weight about 150 pounds, became ill on Aug. 16, 1934, with general aching and soreness over the lower part of the abdomen. The pain was not acute, did not radiate and was equal on the two sides. The bowels moved normally but her abdominal symptoms grew worse and two days later we ex-



Fig. 1.—Photograph of lithopedion.

amined her by request of the family physician. The patient by now had developed intense nausea but only occasional vomiting and was complaining of severe pains in the lower abdomen. She looked quite ill. Menses had begun at fourteen, were regular at thirty-day intervals. She first became pregnant at twenty-six years of age and had a spontaneous delivery. Subsequently, all of six pregnancies ended in abortions or miscarriages. Menopause occurred suddenly at forty-eight, and she had had no trouble since, except that she felt a lump in her abdomen when tired and lying on her back. Temperature was 100° F., pulse 100, and respiration 20.

*Read at a meeting of the Obstetrical Society of Philadelphia, January 3, 1935.

On examination, the abdomen was moderately obese and slightly tympanitic. There was marked tenderness over all quadrants but particularly in the lower right quadrant. Spasm and rigidity were present over both lower quadrants most marked in the right groin. Vaginal examination caused much pain and was not conclusive. The cervix felt normal and was slightly movable with much pain. The uterus was not outlined. The right fornix felt fuller and more tender than the left. A tentative diagnosis of pelvic inflammatory disease or twisted ovarian cyst was made and the patient was sent to the Kensington Hospital for Women. Physical examination after admission was largely negative. Blood pressure was 120/80; heart sounds of fair quality. Hb was 80 per cent, R.B.C. was 4,050,000, W.B.C. was 15,250. The urine showed a heavy trace of albumin, a trace of



Fig. 2.—Roentgenogram of lithopedion showing curving of spine to aid compression into smallest space.

sugar and occasional light granular and hyaline casts. Wassermann, blood sugar, and urea tests later were normal.

The patient was given appropriate supportive treatment and on August 21, under avertin anesthesia, the abdomen was opened through a right rectus incision. A right tuboovarian abscess with many pelvic and omental adhesions, containing odorous pus and involving the appendix, was first found. The right tube and ovary and appendix were liberated and removed. The uterus was of average size and not much involved but the left tube and ovary could not be found, the cornual region being smooth and rounded. While palpating the left side, a large mass was found above the brim of the pelvis, lying free in the abdominal cavity except for its almost complete covering of omentum. As they were somewhat separate, the long bones with their sharp ends were first encountered and removed. Then the lithopedion itself was shelled out without much bleeding. There was no evidence of a placenta, membranes or a pelvic attachment. The ab-

domen was closed with drainage. Part of the wound became infected but the patient was discharged in good condition five weeks later.

On questioning this patient in detail we discovered that in 1916, when about five months pregnant she had visited our prenatal clinic when the fetal heart sounds were heard by several doctors. She then stopped coming, became quite large and in about two months had a "flooding spell." An outside doctor told her she was not pregnant. She lost considerable blood at home but after a few days in bed she quickly recovered. Her periods returned but with more pain than formerly. There were no further pregnancies and she had no severe illnesses.

But for this accidental discovery, she might have carried the stowaway for the rest of her life. Apparently at some time during this period, nutritional disturbances must have destroyed the left tube and ovary. The sex of the lithopedion was indeterminate. There was a thin coating of fatty material beneath which was the hard calcified fetal mass. A small quantity of odorless thick yellow fluid was drained from its interior. Based on Scammon and Calkins' work we calculated the age of this lithopedion to be at least six lunar months.

CORPUS LUTEUM TUMOR

ORAN I. CUTLER, M.D., LOMA LINDA, CALIF.

(From the Department of Pathology, College of Medical Evangelists)

DURING the past few years much attention has been paid to the endocrine functions of certain ovarian tumors. In this relation, a tumor which has recently come to my attention is of considerable interest.

V. B., aged twenty-two, unmarried, began menstruating at the age of thirteen. Her periods were never regular. Frequently she went more than twenty-eight days between menses. Flow lasted five to seven days and was profuse. Of late the bleeding had become more prolonged and profuse, being present most of the time. Pelvic examination showed the uterus to be of normal size and in normal position. A small cervical erosion was present. The right adnexa were apparently normal. The left ovary was palpable and seemed enlarged.

During the twenty-five days following this examination, eight injections of 1 c.c. each of antuitrin-S were administered. This stopped the prolonged and excessive menstrual flow. Six and one-half months after the series of injections of antuitrin-S was completed, the patient again entered the hospital, this time for an appendectomy. During these six and one-half months the menstrual flow had been of ordinary duration and quantity. The last two periods had been more painful than former ones. The patient had also had two attacks of pain in the right lower abdominal quadrant not associated with the menses. Nausea and some vomiting were present with the pain. At operation a large appendix packed with fecaliths was found. The left ovary was also removed.

Pathologist's Report.—The left ovary consisted of a smooth, firm, oval mass which measured 3.5 by 4.5 by 6 cm. On the cut surface, a thin layer of white tissue, 1 to 3 mm. in thickness, was present at the periphery. This layer was very loosely adherent to an underlying mass which occupied most of the ovary. Much of this mass was composed of tissue which was bright yellow in color. Irregular areas in the center of the mass were white. Some of the white areas were firm and opaque. Others were soft and translucent.

The microscope showed that the peripheral white layer consisted of ovarian cortex

in which were fairly numerous immature follicles. The yellow tissue (Fig. 1) was composed of anastomosing strands and sheets of cells having oval nuclei and abundant cytoplasm. Fat stains demonstrated much lipoid material in the latter. The cells were of quite uniform morphology and mitoses were not seen. However, the folded arrangement of the sheets of cells found in the ordinary corpus luteum was not observed. There were fairly numerous small blood vessels ramifying among the strands of cells, but relatively little connective tissue was present. The white translucent areas of the tumor consisted of edematous connective tissue in which tumor cells were loosely scattered. The tumor cells in these areas possessed less cytoplasm than in the yellow areas and the cytoplasm contained relatively little lipoid. The firm white areas consisted of dense fibrous tissue in which some areas of tumor cells were buried (Fig. 2). The tumor cells in these areas contained very little lipoid.



Fig. 1.

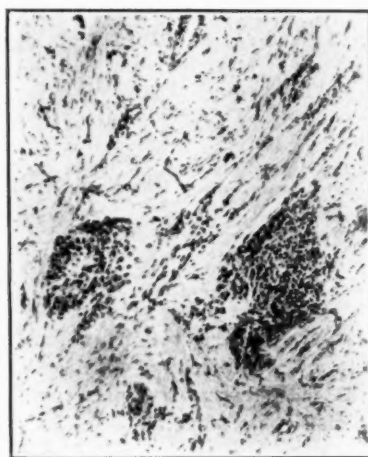


Fig. 2.

Fig. 1.—Cellular lipoid rich portion of tumor near capsule.

Fig. 2.—Dense fibrous area with islands of cells.

DISCUSSION

Plate¹ has made the suggestion that granulosa cell tumors may become luteinized. He found an orange-sized tumor in a patient twenty-three years of age. Two years before the tumor was removed, the patient had a curettage for treatment of profuse menstruation. After the curettage the menses became irregular, followed by sudden cessation seven months before operation. The breasts were swollen and contained colostrum. After the operation the menses reappeared and the breasts returned to normal. Most of the tumor was yellowish and composed of strands and groups of more or less columnar cells containing lipoids. In areas the cells were smaller and fat poor. Plate states that two similar tumors have been seen by Lecene.

Benda and Kraus² have recently reported the case of a woman thirty-eight years of age who had had amenorrhea for two years. At operation a solid ovarian tumor which presented yellow areas was found. Lipoid was present in the cytoplasm of the tumor cells. It seemed quite conclusive that this growth consisted of a granulosa cell tumor undergoing luteinization.

In the case which I have studied, profuse irregular menses were present, as in patients having granulosa cell tumors. The profuse bleeding ceased after the in-

jection of anterior pituitary-like hormone from urine produced during pregnancy. The production of a hormone (Collip³) by the anterior pituitary which causes the transformation of granulosa cells into those of a corpus luteum has been quite definitely demonstrated. It has further been shown that anterior pituitary-like hormone in urine during pregnancy causes only theca luteinization when acting alone. However, in the presence of the luteinizing hormone of the anterior pituitary the action of each is reinforced by the other. It would thus seem reasonable to believe that the change in the character of the menses of the patient under discussion was associated with the luteinization of the granulosa cell tumor. Amenorrhea had not yet appeared in this patient as it had in the cases of Plate and of Benda and Kraus.

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THE FACTOR OF BIRTH TRAUMA IN CANCER OF THE UTERINE CERVIX*

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(From the Department of Gynecology, Woman's Medical College of Pennsylvania)

IN A TIME of rapidly changing opinion, when the indivisible atom of our childhood has been split into many parts, when Newton's law no longer accounts for the falling apple and when the ovum no longer dominates menstruation, it becomes necessary to scrutinize carefully each familiar fact.

The fact to which I invite attention is the relative incidence of cancer of the uterine cervix in parous and in nulliparous women.

The literature on this subject was reviewed recently by Martzloff who concludes in the 1933 edition of Curtis' *Obstetrics and Gynecology* that "over 90 per cent of the cases of cancer of the cervix give a history of one or more previous pregnancies." Probably most of us are in the habit of making somewhat similar statements. Nevertheless these statements do not tell the whole story.

Last spring my own statistics were gently challenged by a physician who asked, "What is the relative frequency of parous and nulliparous women in your Hospital?" I was unable to answer this question, agreed that it was important and determined to rectify my ignorance at the earliest possible date.

As a result, I am able to present certain statistics based on the case histories of four thousand women admitted to the Gynecological Wards

*Read at a meeting of the Obstetrical Society of Philadelphia, January 3, 1935.

of the Woman's Medical College Hospital and Woman's Hospital of Philadelphia. These statistics are shown in Table I.

TABLE I. INCIDENCE OF CANCER OF THE UTERUS IN 4,000 GYNECOLOGIC PATIENTS

NO. OF CASES	AGE	CA. OF CERVIX	CA. OF BODY	TOTAL CA. OF UTERUS
1,000 Single, white nulliparous	20-77	3 (3)* 6	20	26
1,000 Married, white nulliparous	20-79	7 (7)* 14	10	24
1,000 Married, white parous	20-79	37	9	46
1,000 Married, black parous	20-75	28 (14)* 42	1 (1)* 2	44

*No microscopic examination.

From the standpoint of cancer of the cervix, the chief interest of this table lies in the second and third groups.

The second group comprises 1,000 married white women between twenty and seventy-nine years of age who have not borne children. Cancer of the cervix was found in fourteen of these patients or 1.4 per cent.

The third group comprises 1,000 married white women between twenty and seventy-nine years of age who have borne one or more children (deliveries at six months to full term were included). Cancer of the cervix was found in thirty-seven of these patients or 3.7 per cent.

Therefore, according to these statistics, cancer of the cervix occurs about three times as often in married white women who have borne children as in married white women who have not borne children.

In these two groups, the factor of intercourse, venereal infection and contraceptive measures were presumably the same. In the second group, two other factors must be considered. The first of these is stimulation of the cervical epithelium during pregnancy by anterior pituitary hormones (Hofbauer). The second factor is birth trauma.

The factor of pituitary stimulation of cervical epithelium, if, when and as it occurs, is quite beyond our control. The effects of birth trauma can be controlled.

We are all familiar with the appearance of the smooth, firm cervix of the primigravida. We are all familiar with the appearance of this cervix after a difficult labor: flabby, bleeding, torn to a greater or less degree. We are all familiar with the appearance of this cervix six months to a year after delivery.

If the tear has been slight, healing will be complete. If the tear has been extensive, pathology will be present. If the sphincter of the external os has been torn, the cervix will be thickened, its mucous membrane everted, infected, and inflamed.

In this area of chronic epithelial irritation, those puzzling microscopic lesions termed precancerous, canceroid, suggestive of cancer, early cancerous, are very frequently found. It seems worth while to attempt to prevent their formation by means of cervical repair.

The best time to repair the cervix would seem to be when the laceration occurs or within the first twenty-four hours after delivery.

Most authorities on obstetrics are opposed to the idea of primary repair, recommending it only for the control of hemorrhage from a torn cervical artery.

From the gynecologic point of view, laceration of the cervical sphincter is almost as important as laceration of the cervical artery. Neglect in one case will result in immediate death from hemorrhage. Neglect in the other case may result in eventual death from cancer of the cervix, a late maternal mortality.

Primary repair of the lacerated cervix is no more difficult and no more dangerous than primary repair of the lacerated perineum or primary repair of the episiotomy incision. All three procedures demand technical ability, aseptic equipment and adequate assistance.

CONCLUSIONS

1. Cancer of the cervix occurs about three times as often in married white women who have borne children as in married white women who have not borne children.
2. This increased frequency in the parous group is probably the result of birth trauma.
3. The after effects of birth trauma should be prevented by primary repair of the lacerated cervix.

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Terada, E.: Statistics of Uterine Cancer, Japanese J. Obst. & Gynec. 16: 432, 1933.

Among 14,941 female patients seen at the Himeji Red Cross Hospital there were 355 cases of uterine cancer (2.38 per cent). The cervix was involved in 97.8 per cent. The youngest patient was 24 and the oldest 73, the average age for the cervical cancers being 47.4 years and for the corpus carcinomas 54.9 years. The parity was distributed as follows: nulliparas, 8 per cent in the cervix and 25 per cent in the corpus cases; primiparas, 4.6 per cent in the cervix and 12.5 per cent in the corpus cases; para ii to para iv, 4.6 per cent in the cervix and 12.5 per cent in the corpus cases; women with more than four children, 56.2 per cent in the cervix and 12.5 per cent in the corpus cases.

Cancer of the cervix occurred three times more frequently on the posterior lip than on the anterior. In 11 of the 355 cases, pregnancy was associated with the cancer of the uterus (3.2 per cent). The symptoms were as follows: watery discharge 34.7 per cent, bloody discharge 9.3 per cent, uterine hemorrhage 51.4 per cent and pain 13.2 per cent.

J. P. GREENHILL.

TORSION OF THE PREGNANT UTERUS IN PATIENTS WITH KYPHOTIC PELVIS*

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(From the Beth Moses Hospital)

A SURVEY of the current textbooks on obstetrics discloses that the complication of torsion of the pregnant uterus is mentioned briefly or not considered at all. Most of the cases of torsion of the pregnant uterus reported in the literature were associated with tumors of the uterus, ovarian cysts, bicornuate uterus, or some form of asymmetry of the uterus. Two cases in which there was no pathology of the uterus or adnexa were reported by Egon Wienzierl. One was in a patient with sinistroscoliosis of the spinal column and both cases were discovered during the performance of cesarean sections, performed in the interest of mother and child rather than for shock and hemorrhage. One case showed ninety degrees and the other, two hundred degrees of rotation of the uterus, and neither was diagnosed prior to operation. Appended herewith is the report of a case of ninety degrees torsion of the pregnant uterus in a patient with a kyphotic pelvis.

Mrs. M. H., aged twenty-three, Italian, married eleven months, nullipara, gravida i. Her last period occurred July 8, 1933, and the estimated date of confinement was April 15, 1934. Patient had had a caries of the spine at two and one-half years.

Physical Examination.—Sept. 6, 1933, height: 4 feet 1 inch; weight: 93 pounds, with a marked lower lumbar kyphosis. Vaginal examination: Pregnant uterus about seven weeks was found. Pelvic measurements were as follows:

LC.	28	RO.	20.5	DC.	11
LS.	25	LO.	20.0	Bisischial	5.5-6
LT.	27	EC.	16.5		

The symphysis was prominent and pubic arch narrow.

The antepartum course was essentially normal except for vomiting in the early months of pregnancy, which was easily controlled. The patient's weight increased from 93 pounds to 110 pounds. After the first half of pregnancy, the abdomen was pendulous. The fetal parts were easily outlined; more so than usual. The fetal heart could be heard only over the xiphoid cartilage. As the pregnancy advanced to term, the abdomen became so pendulous that the fetus appeared to be in a sac hanging over the symphysis, especially when the patient was erect. The umbilicus could not be seen after the fifth month and was located on the posterior surface of the pendulous sac. The abdominal wall was extremely thin, stretched, and under tension. The abdominal veins were prominent and distended.

X-ray examination, March 20, 1934, showed marked lumbar kyphosis due to destruction of the bodies of the third and fourth lumbar vertebrae; a well-developed fetus in the false pelvis in the transverse position with the head in the right iliac fossa. The transverse diameter of the outlet was contracted, with marked narrowing of the bisischial diameter.

On April 10, 1934, five days prior to the estimated date of confinement, an elective cesarean section was performed under local infiltration anesthesia (1 per cent

*Read before the Brooklyn Gynecological Society, March 1, 1935.

novocaine). The abdominal wall was infiltrated in layers. The skin, fascia, and muscle were under tension and of extraordinary thinness. In order to make a sub-umbilical midline incision, it was necessary for the assistant to raise and hold the pendulous sac upward and cephalad, both during infiltration and incision. When the abdomen was opened, the uterus appeared markedly cyanotic and congested, and the uterine veins were full and prominent. The right tube and ovary presented to the left of the midline incision; the left tube and ovary were in the hollow of the sacrum and to the right. The uterus was rotated approximately ninety degrees from right to left. The tubes and ovaries appeared congested and edematous. The uterus was rotated to its normal position following which the cyanosis and congestion markedly subsided. A low midfundal incision was made and the baby, lying in the right scapuloposterior position, was extracted by the feet. The placenta was on the anterior wall of the uterus and was extracted manually. An ampule each of pituitrin and gynergen was given hypodermatically at the time of the uterine incision. Bleeding seemed more profuse than usual. The uterus contracted firmly. The uterus was closed in two layers, one deep and one superficial of chromic No. 2 interrupted sutures, and peritonealized with a running "baseball stitch" of No. 2 plain catgut. The tubes were infiltrated and sterilization was performed by the Pomeroy method. The abdomen was closed in layers. The patient made an uneventful recovery and was discharged with a living baby (baby's birth weight 5 pounds 14 ounces), twelve days after operation.

The follow-up showed a firm abdominal wall, no postoperative hernia, well-involuted uterus, cervix backward, fundus forward, and nonadherent; adnexa and parametrium negative.

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358 NEW YORK AVENUE

SQUAMOUS CELL CARCINOMA OF CERVIX; ADENOCARCINOMA OF FUNDUS OF UTERUS*

MARK T. GOLDSTINE, M.D., CHICAGO, ILL.

MRS. L. W., aged forty-six years, married twenty-three years; one child aged eighteen; no miscarriages. Nothing remarkable in family history. Menstruation began at fifteen, irregular, usually coming on the average of every six weeks; flow scant, never lasting more than two days. Menstruation ceased at about age of thirty-three, and there were no periods or bleeding for twelve years previous to two months before examination. At this time there appeared a very little spotting of blood, which increased in amount and showed every day. Bleeding started simultaneously with a very severe attack of herpes on head and neck. Weight at the time of examination 225 pounds. Patient has always been quite heavy and had no recent loss of weight.

Pelvic Examination.—Vulva and vagina showed no pathologic changes. The cervix was large, with several small stellate lacerations; on the posterior lip of the external os and well away from the opening was a raised area 1.5 c.c. in diameter, dark red in appearance and not bleeding, and firm to touch. The body of the uterus was the size of an eight weeks' pregnancy, smooth and firm,

*Presented before the Chicago Gynecological Society, January 18, 1935.

and the uterus was easily movable. Appendages were apparently normal. The nodule on the posterior lip of the cervix was completely excised, a curettement was done, and we obtained a large amount of soft friable material from a pocket in the left horn of the uterus. The cavity of the uterus was about 15 cm. in length.

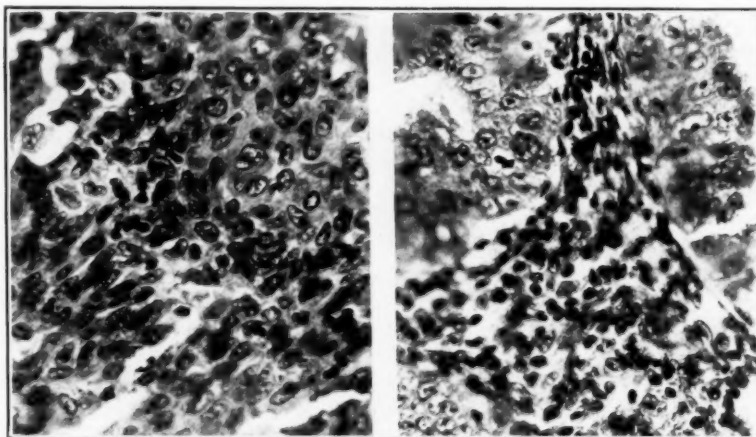


Fig. 1.

Fig. 2.

Fig. 1.—High power of section showing squamous cell carcinoma of cervix.
Fig. 2.—High power of adenocarcinoma of the fundus of uterus.



Fig. 3.—Microphotograph showing both squamous cell carcinoma A, of cervix and adenocarcinoma of fundus B.

Microscopic examination showed the nodule from the cervix to be a distinct squamous cell carcinoma (Fig. 1). The tissue from the fundus was typical adenocarcinoma (Fig. 2).

Hysterectomy was performed one week later with the removal of a large symmetrical uterus previously described. The fundus contained a large amount of friable tissue which was adenocarcinoma.

Microscopic study showed no carcinoma in the lower uterine segment. There was approximately 8 cm. distance between the carcinoma of the fundus and that of the cervix (Fig. 3). There was no evidence of more carcinoma in the cervix,

and we apparently removed all in the original biopsy. There was a mild chronic cervicitis. There was congenital absence of one ovary. The wall of the uterus was 3.5 cm. in thickness, firm but not hard and appeared to have more fibrous content than usual. The carcinoma invaded the wall to an average depth of 1 cm. There were no metastases found.

FULL-TERM UNILATERAL TUBAL TWIN PREGNANCY

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(From the Departments of Pathology and Surgery of The Meriden Hospital.)

UNILATERAL tubal twin pregnancy is not common. A number of authentic cases, however, have been reported. Arey in 1923 collected from the literature thirty-eight cases which he accepted as authentic, and added two cases of his own. We have found reports of three cases of unilateral tubal twin pregnancy which have been published since 1923. Kynock reported a case in 1924, Nota in 1929, and Deichgraber reported a case in 1931 in which the fetuses were in the sixth month of development. In Folet's case, listed by Arey, one of the fetuses reached maturity.

We present an additional case of unilateral tubal twin pregnancy which we believe is unique, in that both fetuses reached maturity and were apparently alive at full term, though they were delivered dead by abdominal section at the twelfth month. We were unable to find a similar case described.

Patient was a German woman thirty-two years of age. Two children alive and well, delivery normal in each instance. Menstrual periods always regular. Patient had for the last four years a chronic cervicitis which was due to the gonococcus.

The last menstrual period ceased on Nov. 20, 1925, and was followed by morning sickness, nausea and vomiting. The patient thought at this time that she was pregnant. Her former pregnancies began exactly the same way.

On March 3, 1926, patient was admitted to the hospital complaining of left lower quadrant abdominal pain and vaginal bleeding. She stated that about one month prior to this admission she had backache and abdominal cramps at irregular periods. The symptoms disappeared after nineteen days in the hospital, and the patient was discharged with a tentative diagnosis of chronic salpingitis or ectopic pregnancy.

The patient stated that she felt definite fetal movements on June, 1926, which was about seven months after the cessation of the menses. The abdomen was considerably enlarged at this time.

On September 15, over nine months after the last menstrual period, the patient was admitted to the hospital with the complaint of slight vaginal bleeding. She thought that she was at full term and that labor ought to begin. No fetal heart sounds were heard. After five days in the hospital bleeding ceased and the patient was again discharged.

On November 16, or about twelve months after cessation of the last menstrual period, patient was admitted to the hospital for the third time. This time she complained of weakness, fatigue, and loss of weight. On physical examination no fetal heart sounds were heard. (Bimanual examination at this time revealed a small, firm uterus which was quite easily outlined.) Palpation revealed definite fetal parts and laparotomy was decided upon.

Laparotomy.—The abdomen was opened by a long incision just to the left of the midline. There was a large mass in the left side of the abdomen which was covered over with omentum and coils of small intestine. The mass appeared to be attached to the left tube, and the uterus was pushed to the right side of the abdomen. The mass was freed and delivered through the abdomen. At this stage of the operation, the wall of the mass ruptured and two dead female fetuses were removed from the sac. The sac appeared to be adherent to the left side of the uterus so a subtotal hysterectomy was performed. The abdomen was closed without drainage. The patient made an uneventful recovery and is alive and well at the present time.

Pathologic Examination.—The specimen consisted of two well-developed similar female fetuses, uterus with right tube and ovary attached, and placenta with a large firm membranous sac situated in the region of the left tube and ovary.



Fig. 1.



Fig. 2.

Fig. 1.—Shows normal uterus with right tube and ovary attached. A portion of cervix and the internal os are shown. The isthmus of the left tube is shown and also the inferior surface of the placental mass.

Fig. 2.—Shows the fetuses.

One twin measured 40 cm. and weighed 1,730 gm. The other measured 34 cm. and weighed 1,400 gm. The skin over each was firm and smooth and was covered with an abundant vernix caseosa.

The mass to the left of the uterus measured 14 by 8 cm. and was composed of placental tissue. The external surface was covered by whitish glistening fibrous tissue which extended beyond the edge of the placental mass and formed the outer layer of the sac. Two cords were implanted into the placental mass about 7 cm. apart. There was one chorion and two amnions. The twins were apparently uniovular. The left tube was identified at the left margin of the uterus. It then appeared to fade out over the placental mass. The left side of the uterus was slightly adherent to the placental mass but the adhesions were readily broken down.

The myometrium was 2.5 cm. in thickness. The endometrium was pinkish and smooth. The right tube 7.5 cm. in length and appeared normal. The right ovary measured 3.5 by 2 cm. and contained two reddish corpus luteum cysts.

Microscopic Examination.—Sections were taken from the placenta and membranes, the right tube and ovary, both cords, and from the isthmus of the left tube. The tissue was fixed in 10 per cent formalin and routine H & E stains were made. Right tube and ovary, uterus, isthmus of left tube, and cords appeared normal.

Placenta: The cells of the placenta did not stain clearly. There were a number of small foci of calcification and a few of the blood vessels were thrombosed. The outermost layer of the placenta was composed of fibrous tissue. This layer of fibrous tissue also formed the outer layer of the membranes which enclosed the fetuses.

We have found reports of three cases of unilateral tubal twin pregnancy that have been published since 1923.

We believe that the death of the fetuses in the case described was probably due to mechanical interference with their blood supply as a result of the pressure of the fetuses on the placental blood vessels. It seems reasonable to expect that had the diagnosis been made and laparotomy performed at the ninth month instead of the twelfth, viable fetuses would have been recovered.

Including the case described above, a total of forty-four proved cases of unilateral tubal twin pregnancies has been published up to 1933.

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A NEW INSTRUMENT FOR THE ACCURATE READING OF THE MEASUREMENT OF THE DIAGONAL CONJUGATE

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(From the Department of Obstetrics and Gynecology, Cornell Medical College)

NO INSTRUMENT has yet been devised which is satisfactory for the routine measurement of the diagonal conjugate from which the true conjugate can be estimated. The usual method employed consists in palpating the promontory of the sacrum with the tip of the second finger and while keeping the finger closely applied to its most prominent surface the radial side of the index finger or hand is closely applied to the pubic arch and this point marked by the index finger of the other hand. The hand is then withdrawn from the vagina and the distance between the tip of the second finger and the marked point is measured by an assistant using a Martin's pelvimeter, or some other caliper.

Variations in measurements obtained by senior members of our attending staff upon the same patient led to an investigation of the method employed. Much to our surprise it was found that the pelvimeters in use in the clinic which were relatively new instruments thought to be the best procurable, varied as much as one-half a centimeter on either side of a given mark so that an accurately palpated diagonal conjugate measurement for instance could be interpreted as varying from 11.5 cm. to 10.5 cm. depending on the instrument used for measuring the distance. The instruments were sent back to the manufacturer for correction but later after routine use the differences were again found. The variation so found is not important in external pelvimetry but an error of as much as 1 cm. in the measurement of the diagonal conjugate may lead to a serious error in judgment in deciding on the treatment of a patient.

The instrument shown in Fig. 1 was gradually evolved in this hospital and it has been in use in all examining rooms in our Out-Patient Department, the examining rooms on our various pavilions, and in all our delivery rooms, for the past two years. In addition, practically all members of our attending staff now use the instrument in their private offices. It consists of a single piece of monel metal, 2 mm. thick, angulated at right angles so that there is a base 6 cm. square with screw holes to attach the instrument permanently to the wall, preferably on the tiling over a washstand. The portion of the instrument projecting from the wall is 14 cm. in length, 2.5 cm. wide, and is graduated in quarter centimeters from 8 to 13 cm. from the base. The method of employing the instrument is simple and illustrated in Fig. 1.

The advantages of using this device for measuring the distance of the diagonal conjugate marked on the hand are:

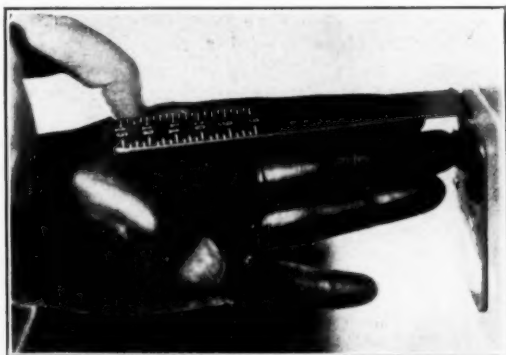


Fig. 1.

1. The measurement so recorded can be accurately read on the scale with no possibility of a variation from the correct reading, thus eliminating an unknown possible error that may develop in a movable instrument after varying periods of use.
2. The procedure is carried out entirely by the operator. The assistance and possible errors of a second person operating a pelvimeter are thus eliminated.
3. The same pressure can be exerted by the second finger on the base of the instrument as was exerted on the promontory of the sacrum.
4. The instrument is simple, inexpensive, will not deteriorate and should last indefinitely.
5. It requires no upkeep except cleaning which is a very simple process.

The original instruments in use in the Woman's Clinic of the New York Hospital, were handmade by the engineering department of the Hospital and have proved entirely satisfactory.

This appliance is made by the G. P. Pilling & Son Company, Philadelphia.

SARCOMA AND ADENOCARCINOMA OF BODY OF UTERUS; ADENOCARCINOMA OF CERVIX*

MARK T. GOLDSTINE, M.D., CHICAGO, ILL.

MRS. H. R., aged fifty years; married thirty years; two children, youngest twenty-four years; no miscarriages. Both parents dead several years from cardiovascular disease. One sister died at the age of forty-two from carcinoma of the breast; one sister living and well. Menstruation began at about thirteen years, regular, thirty-day type, and ceased at forty-seven. No blood was seen for two years. A very small discharge of blood from the vagina appeared one year previous to observation, increasing in amount until for two months it was a

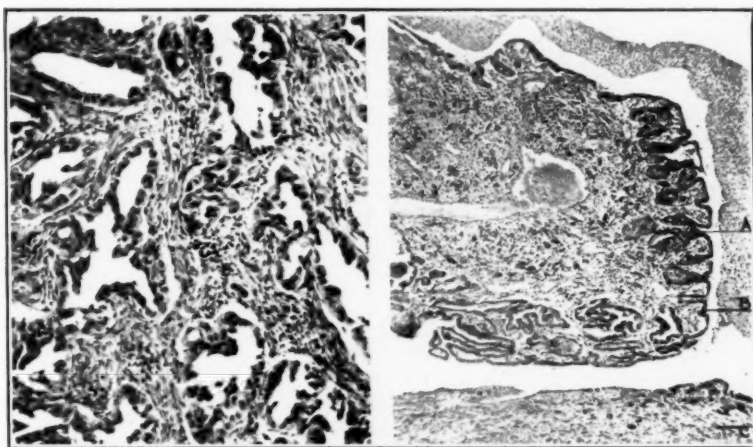


Fig. 1.

Fig. 2.

Fig. 1.—Photomicrograph showing adenocarcinoma of cervix.

Fig. 2.—Photograph showing sarcoma in the body of the uterus and the adenocarcinoma B, along the edge. The adenocarcinoma of the cervix is shown in C.

daily occurrence though she never had a profuse hemorrhage. There was no evident loss of weight or extraordinary fatigue. Weight was 184 pounds. History otherwise not remarkable.

Pelvic Examination.—Patient was bleeding rather freely. Vulva and vagina showed no pathologic changes. Cervix somewhat larger than normal; external os freely patent with blood flowing from it. Uterus was the size of a six weeks' pregnancy, smooth, very firm, tender to touch, and anteflexed and only very slightly movable. The appendages were apparently normal. There were some thickening and induration at the cervicovaginal junction in both broad ligaments.

A biopsy of the cervix and a curettage were done. There was a marked excavation in the cervical canal from which tissue was removed by splitting the cervix laterally on both sides. A large amount of tissue was removed with curette, and from upper right horn of uterus several fair-sized polypi. All tissue was very friable.

*Presented before the Chicago Gynecological Society, January 18, 1935.

Microscopically, the tissue from the cervix was adenocarcinoma (Fig. 1), and the polyps were definitely sarcoma (Figs. 2 and 3).

Hysterectomy was performed and on opening the uterus there were two large masses protruding from the fundus covered by a markedly thickened endometrium. Microscopically these tumor masses were large, round and spindle cell sarcomas with numerous giant cells. The endometrial covering was typical adenocarcinoma (Figs. 2, 3, and 4). The myometrium was free from sarcoma,

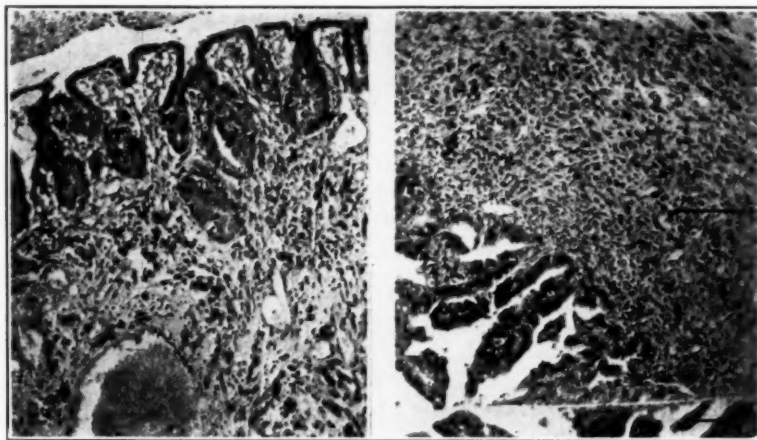


Fig. 3.

Fig. 4.

Fig. 3.—Higher magnification of the same.

Fig. 4.—Higher magnification showing sarcoma A, and carcinoma, in body of uterus B.

and we cannot say that the adenocarcinoma of the cervix was an independent growth from the carcinoma of the body of the uterus (Fig. 4). At least from study of the uterus the epithelium and glands of the cervix were so much destroyed that a differentiation could not be made. The sarcomatous process was fairly early, because it had not invaded the myometrium and antedated the carcinoma, particularly in the polypoid tumors.

Preisseecker, Ernst: *The Use of the Colposcope in Gynecology*, Zentralbl. f. Gynäk. 56: 2280, 1932.

The principal advantage of the colposcope lies in the ease of early diagnosis of carcinoma of the portio and cervix. Lesions on the posterior vaginal wall and fornix lend themselves especially well to inspection. For example, a lesion 1 mm. in diameter, thought to be leucoplakia, was shown to be an early carcinoma. Such a lesion might easily have been missed by the naked eye. Pregnancy may also be diagnosed by the third or fourth month. The fine subsurface vessels become much broader and more reticulated in pregnancy.

Squamous and columnar epithelium are readily differentiated, thus making the colposcope especially useful in distinguishing erosions due to infection, from "physiologic" ectropion.

The author concludes that the investigation of leucoplakic spots so as to establish an early diagnosis of carcinoma, is the most important function of the colposcope.

WILLIAM F. MENGERT.

NONPOLYPOID SARCOMA OF CERVIX UTERI*

MARK T. GOLDSTINE, M.D., CHICAGO, ILL.

MRS. M. B., aged forty-six, of Armenian nativity, married twenty-five years. She had had no pregnancies. Her entire immediate family were killed during the World War. Menstruation began at fourteen, regular twenty-eight-day type, and apparently normal as to duration and length. The first deviation from normal occurred at the regular menstrual period in August, 1934; it was very profuse and lasted about ten days instead of five. Two weeks later she had rather profuse bleeding for two days, and from then on bled more or less every day until about the middle of October, 1934, when she began to have daily

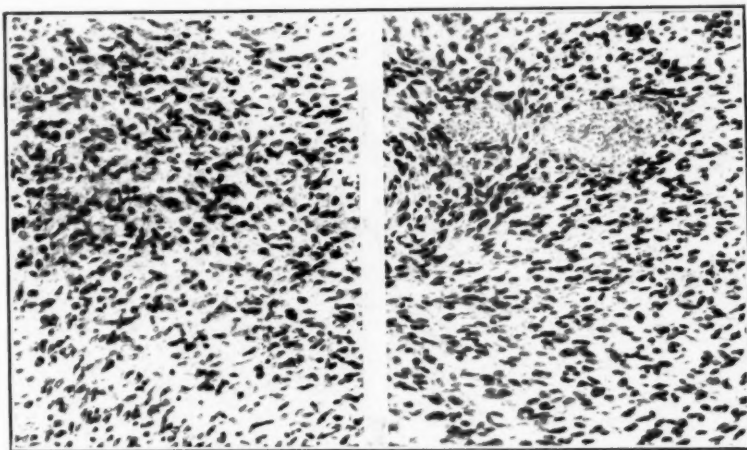


Fig. 1.

Fig. 2.

Fig. 1.—Section showing nonpolypoid sarcoma of cervix.

Fig. 2.—Another view of Fig. 1.

hemorrhages. On November 5, when she came for examination she showed all the objective signs of a rather severe secondary anemia.

Pelvic examination showed a negative vulva and vaginal canal. There was profuse bleeding from a large friable mass of tissue in the cervix. The external os was 3 cm. in diameter, the canal was obliterated, leaving only a shell of cervix, and only after removing a large amount of tissue were we able to find the opening at the internal os and reach the fundus of the uterus. The fundus was of normal size. The entire uterus was fixed, and there was very marked infiltration into the broad ligaments and rectovaginal septum. The appendages were apparently normal. Careful examination of the growth failed to reveal any polypoid formation, and we are fairly certain that this was not originally a polyp which had undergone tissue change. The growth infiltrated all the cervical tissue equally in its entire circumference. The fundus was curetted and a very small amount of tissue obtained.

*Presented before the Chicago Gynecological Society, January 18, 1935.

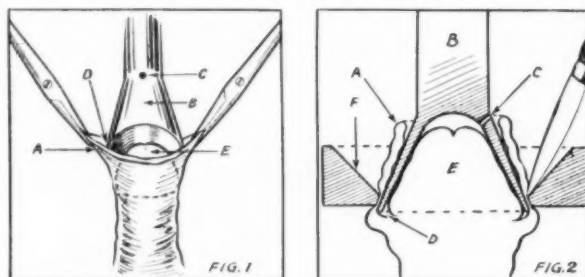
Microscopic Examination.—Sections through numerous pieces of tissue from the cervix (Figs. 1 and 2) showed a very irregularly growing malignancy. The cells had sizes from small to large, shapes from spindle to round, and nuclei which present many mitoses. These nuclei were fairly dark, round to oval, vesiculated, but did not contain nucleoli. The predominating type of cell was spindle in shape. There were no cell groups typical of carcinoma, no pearl formation. These cells were undoubtedly an undifferentiated sarcoma, which seemed to be very rapidly growing. A few cervical mucosal glands were present in two of the fragments of tissue. The endometrium was very atrophic and showed no evidence of malignancy.

The pathologic diagnosis was spindle cell sarcoma, in places undifferentiated.

BLOODLESS CIRCUMCISION OF THE NEWBORN

HIRAM S. YELLEN, M.D., BUFFALO, N. Y.

CIRCUMCISION is one of the oldest operations recorded in the history of medicine, and while the method of procedure has kept pace with medical progress in general, there has always been the possibility of a hemorrhage with each case. Medical literature records many fatal hemorrhages and many infections as a result of circumcision of the newborn, and it is known that 2 per cent of all skin cancers are penis cancers. With this in mind we set about to develop a safe and



simple apparatus for the performance of this operation, with the result that we now have a clamp which not only eliminates the possibility of hemorrhage but also restricts the minimum chance of infection without the use of sutures.

About a year ago Aaron Goldstein of this city developed a clamp which we have used in many cases. This efficient instrument is small, compact, light as strength will permit, and can be operated without an assistant. The technic is quite simple, and the time required is less than that by any other method. With the use of this clamp we never employ sutures, no bleeding is encountered, and it leaves a clean-cut incision which heals perfectly in thirty-six hours with practically no chance of infection because the mucous membrane and skin are securely clamped together.

Fig. 3 is the clamp itself and Fig. 1 and Fig. 2 are diagrams showing the procedure. The following instruments and material are all that is really required: the clamp, 2 small hemostats, a probe with flattened end, a scissor with one blunt blade, an abscess knife or sharp pointed scalpel (No. 12 Bard-Parker blade is ideal), sterile vaseline, and vaseline gauze.

METHOD

After properly cleansing the penis (*E*) and pubis, the dorsal aspect of the prepuce (*A*) is put on a stretch by grasping it on either side of the median line with a pair of hemostats. A flat probe, anointed with vaseline, is then inserted between the prepuce and the glans to separate adherent mucous membrane. The prepuce is then gently drawn backward exposing the entire glans penis (*E*). This is again cleaned. In cases where the prepuce is drawn tightly over the glans, a partial dorsal slit will facilitate applying the cone of draw stud over the glans. (Note: If too long a slit is made, the cone has a tendency to slip off the glans. The slit should, therefore, be made only sufficiently long to enable the cone to be easily applied.) After anointing the inside of the cone (*B*), it is placed over the glans penis allowing enough of the mucous membrane to fit below the cone so that too much is not removed. The prepuce is then pulled through and above the bevel hole in the platform (*F*) and clamped in place. In this way the prepuce is crushed against the

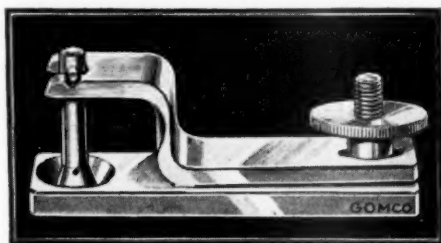


Fig. 3.

cone causing hemostases. We allow this pressure to remain five minutes, and in older children slightly longer. The excess of the prepuce is then cut with a sharp knife without any danger of cutting the glans, which is always protected by the cone portion of the instrument, leaving a very fine $1/32$ of an inch ribbon-like membrane formed between the new union of the skin and mucous membrane. The pressure is then released. The circumcision is completed and the penis covered with vaseline gauze. No anesthesia is used.

On children older than twelve months, we find it is advisable to insert a few sutures.

At this date we have performed more than five hundred circumcisions on the newborn and as yet have not encountered any infection or hemorrhage.

Nelson, Warren O.: *Studies of the Physiology of Lactation*, Endocrinology 18: 33, 1934.

Ovarian hormones are active in the production of mammary gland growth during pregnancy, but they inhibit lactation during that period. In animals the high content of the ovarian hormones also appears to inhibit the secretion of the lactation-inducing hormone of the anterior hypophysis. With the decline in the ovarian hormone content at parturition the inhibitory influences are removed, the lactation-inducing hormone is secreted, and lactation results.

J. THORNWELL WITHERSPOON.

A NEW COLPOSCOPE*

HARRY O. MARYAN, M.D., CHICAGO, ILL.

(From the Department of Obstetrics and Gynecology, University of Illinois)

THIS colposcope is a monocular achromatic prismatic telescope giving magnifications of 6, 10, 13, 18, 25, and 30 diameters, at a focal distance of $6\frac{3}{4}$ inches from the cervix to the front lens. It gives an erect image and has a fixed focus. It can be used on a circuit of 110 V. 60 Cy. A.C. or D.C. current, as it contains a rheostatic cord attached to the lamp.

The magnification can be increased by interchanging the eyepieces as they are numerically marked. The free working distance from the cervix to the front lens is $6\frac{3}{4}$ inches. The distance from the introitus to the front lens is $2\frac{3}{4}$ inches, leaving adequate room to perform direct biopsies, electrical cauterization, or coagulation, and to perform any manipulation which may be necessary, including Schiller's test. We have found for preliminary study that the six power magnification acquaints the observer with the general picture. After this preliminary study the ten power eyepiece is used to locate carefully the suspicious lesion or area. The ten power magnification is universally accepted by most observers. The higher the magnification the greater is the distortion and the smaller becomes the visual field.

The lamp is housed on top of the colposcope and just in front of the lens, with which it is in direct focus. It contains a 16 volt, 15 C.P. bulb. Proper illumination is very essential in order to give a nonglaring and a nonfogged field better to visualize the cervical lesion. The illuminating system, which contains a special condensing lens, gives a bright nondiffusing concentrated white oval light 50 mm. in diameter. We have found that by tilting the colposcope at an angle of 30° , and a little above the center of the speculum, we can get a better perspective. The colposcope is mounted on a rack and pinion, for finer focusing. And this in turn rests on the ball and socket joint with which one can angulate in almost any direction. To this is attached a short mounting sleeve, which fits into the adjustable tripod stand.

The next important step is to obtain adequate exposure and to have the field as dry as possible. For this we have used sand-blasted Grave's specula and Guttman's operative speculum. In this way unnecessary glare and reflections will be done away with, and will prevent the fogging of the colposcopic picture. We have found that Guttman's operative speculum is especially adapted for adequate vaginal exposure. The vagina, fornices and the cervix should be carefully wiped clean and dry with 1 per cent Lysol solution on a cotton sponge. The heavy mucoid discharge from the cervical canal may be dissolved with "caroid powder" on cotton applicator. It may be necessary to repeat this procedure several times to secure a dry field and avoid the fogging of the colposcopic picture. The observer can now visualize through the colposcope the cervix, the fornices, and the cervical canal and detect conditions that he was not able to see with the naked eye.

It seems to me that fundamentally, in order to interpret the colposcopic findings, one must be acquainted with the underlying pathology of chronic cervicitis. This we have shown in our clinic to be a deep infection of the compound racemose glands, which is characterized by a periglandular and a perivascular lymphocytic infiltration and a downward proliferation to the stroma and to the cervical lips of

*Presented at a meeting of the Chicago Gynecological Society, October 19, 1934.

the compound racemose glands. This is what is generally termed as an erosion, but is a misnomer. Rightfully, it should be called a chronic pancervicitis or chronic cervicitis. It is this picture and the peculiarities that it gives which one has to understand before colposcopic findings can be correctly interpreted. This will enable the observer to differentiate between apparently normal and doubtful tissue.

The colposcopic findings should always be checked by multiple or serial tissue sections, and in this way mistaken tissue biopsies will be greatly reduced.

A malignant leucoplakia, shown in Fig. 2, presents a definite demarcation of

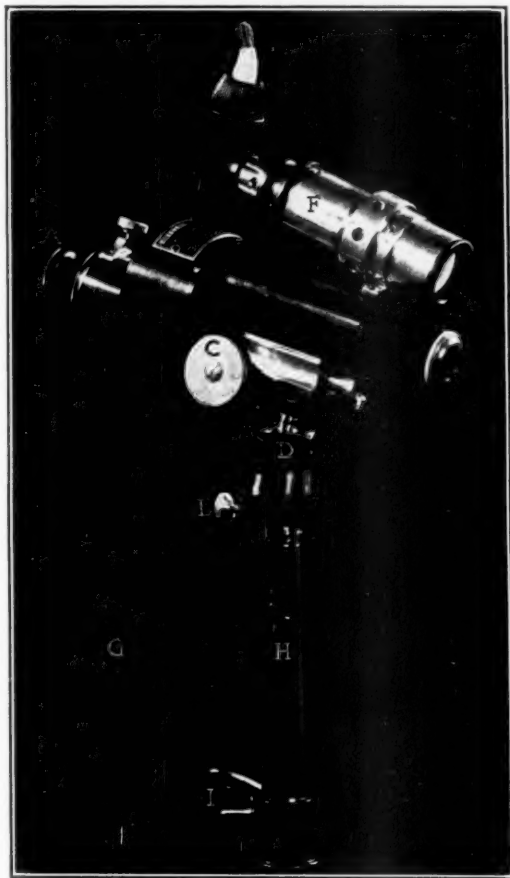


Fig. 1.—A, Eyepiece, B, telescope, C, micrometer, D, universal swivel joint, E, clamp of extension rod for telescope, F, lamp attachment, G, rheostatic cord, H, extension rod, and I, clamp of stand.

the normal from the malignant epithelium by means of the oblique line. This obliquity is characteristic and results according to Schiller from the more rapid growth of the deep layer of the carcinomatous lesion. The marked anaplasia of the cells, the hyperchromatosis, abundant mitoses, and the opaqueness of the staining quality of the cellular structures are also well marked. However, the basal membrane is intact. This picture of malignant leucoplakia, we feel, is diagnostic of incipient intraepithelial epithelioma.

In Fig. 2 is shown a marked hyperplasia and thickening of the stratified epithelium of the cervical lip surrounding the misplaced compound racemose glands in

the stroma of the portiovaginalis. Apparently the source of irritation is an infection of the compound racemose glands.

Colposcopy is primarily used for the detection of pinpoint leucoplakias, intra-

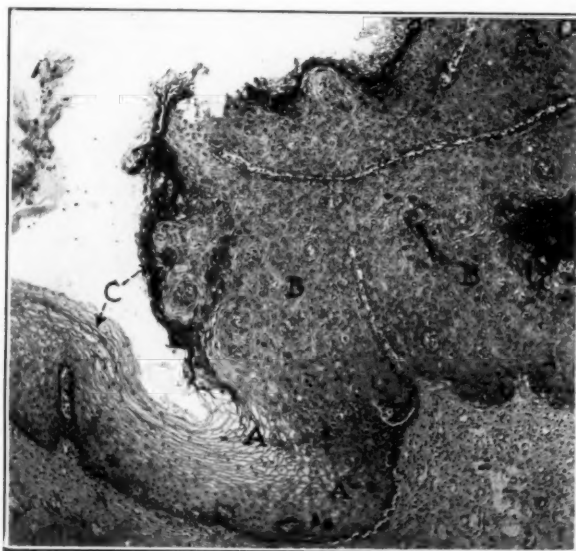


Fig. 2.—*A*, Oblique line, demarcating the normal from the malignant epithelium. *B*, Hyperplasia, hyperchromatosis, mitosis, and anaplasia of cells with intact basement membrane. *C*, Hyperkeratosis.

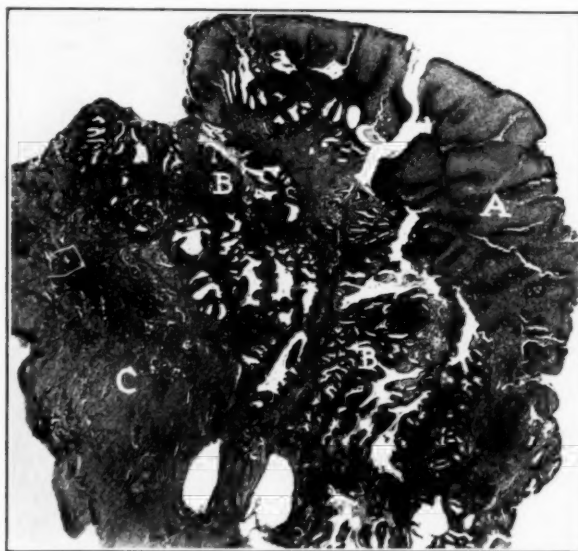


Fig. 3.—*A*, Marked hyperplasia and thickening of the stratified squamous epithelium. *B*, Misplaced compound racemose glands in stroma of portio vaginalis. *C*, Hyperplastic connective tissue.

epithelial epitheliomas, and to eradicate any suspicious cervical lesions. In this way the mortality incidence of 85 per cent of the hopeless cases of carcinoma of the cervix will be greatly reduced.

REFERENCE

- (1) Maryan, H. O.: AM. J. OBST. & GYNEC. 23: 555, 1932.

Society Transactions

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF JANUARY 3, 1935

The following papers were presented:

Abdominal Pregnancy With Removal, After Eighteen Years, of a Six Months' Lithopedion. Dr. Adrian W. Voegelin. (For original article, see page 129.)

The Factor of Birth Trauma in Cancer of the Uterine Cervix. Dr. Catharine Macfarlane. (For original article, see page 133.)

Discussion by Drs. J. A. McGlinn and P. F. Williams.

The Treatment of Abruptio Placentae. Dr. John A. McGlinn and Dr. W. B. Harer.

Hormonic Induction of Menstruation in Amenorrheas of From Three Months' to Nine Years' Duration. Dr. Charles W. Dunn.

Discussion by Drs. C. Mazer, J. Hoffman and F. L. Payne.

BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF MARCH 1, 1935

The following paper and case reports were presented:

Torsion of the Pregnant Uterus With Kyphotic Pelvis. Dr. B. Rabbiner. (For original article see page 136.)

Melanoma of the Urethra. Dr. A. H. Rosenthal (by invitation.) (For original article see page 115.)

Choice of Cesarean Section. Dr. H. C. Williamson.

CHICAGO GYNECOLOGICAL SOCIETY

MEETING OF DECEMBER 21, 1934

The following papers were presented:

Hemorrhage in Late Pregnancy. Dr. Philip H. Smith. (For original article see page 62.)

Placenta Previa. Dr. David S. Hillis.

The Rôle of Transfusion in the Treatment of Obstetric Hemorrhage. Dr. Wm. J. Dieckmann and Dr. Edwin F. Daily. (For original article see page 1.)

MEETING OF JANUARY 18, 1935

The following case reports were presented:

(1) **Sarcoma and Adenocarcinoma of Body of Uterus; Adenocarcinoma of Cervix.** (For original article see page 143.) (2) **Squamous Cell Carcinoma of Cervix; Adenocarcinoma of Fundus of Uterus.** (For original article, see page 137.) (3) **Nonpolypoid Sarcoma of Cervix Uteri.** (For original article, see page 145.) All by Dr. Mark T. Goldstine.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D.

Selected Abstracts

Uterine Carcinoma

Fahmy, E. Chalmers: *An Analysis of 937 Cases of Post-Menopausal Hemorrhage*, J. Obst. & Gynec. Brit. Emp. 40: 506, 1933.

Among the 937 cases of postmenopausal hemorrhage, a definite disease entity of anatomic origin was found in 796 women (85.0 per cent). Functional bleeding, therefore, constitutes a small group of only 15.0 per cent. Bleeding in 43.1 per cent of the total cases was of malignant origin. Of this group nearly three-fourths, or 35.5 per cent of the total series had uterine cancer. The author concludes, "that a fairly constant, moderate hemorrhage extending over many weeks is probably, though not necessarily, of malignant origin."

WILLIAM F. MENGERT.

Schultz, W.: *Corpus Bleeding in Old Women*, Monatschr. f. Geburtsh. u. Gynäk. 95: 76, 1933.

Schultz emphasizes that not all bleeding which occurs in old women is due to carcinoma. He bases this statement upon a series of 232 cases of bleeding in elderly women observed in the Koenigsberg clinic. In the cases where bleeding came from the body of the uterus only one-tenth were due to malignancy. In more than half of the remainder of these cases the source of the bleeding was inflammatory necrotic processes in the endometrium. In some cases hyperplasia was found and in others polyps were present. Most of the latter were situated in the tubal corners. In some instances disturbances in the circulation such as hypertension were the cause of the bleeding. In six cases ovarian tumors were associated with the uterine bleeding but in only one of these six cases was the ovarian tumor responsible for the bleeding.

When bleeding from the body of the uterus occurs, we should first think of carcinoma but if this is ruled out by curettement, the latter treatment usually suffices to produce a cure.

J. P. GREENHILL.

Tourneux, J. P.: *Cancer of the Cervix in Cases of Uterine Prolapse*, Gynécologie 33: 273, 1934.

In the French literature there are reports of only five cases of prolapse of the uterus associated with cancer. Tourneux adds a sixth case. Among the 27 cases reported in the entire literature most women were between 60 and 70 years of age.

The treatment of choice is vaginal hysterectomy. The many theories advanced to explain the infrequency of the association of cancer of uterine prolapse are unsatisfactory.

J. P. GREENHILL.

Haegler, H.: The Coincidence of Uterine Prolapse and Carcinoma of the Portio,
Arch. f. Gynäk. 150: 135, 1933.

Carcinoma rarely develops in the prolapsed uterus, there being less than twenty such cases reported in the literature. The author reports five instances occurring among 11,045 women seen in the second Frauenklinik in Vienna between 1926 and 1931. He also adds two others seen by Weibel in Prag. This gives an incidence of 1.2 per cent among the 395 women suffering from prolapse, while the incidence among the women without prolapse was 7.2 per cent. Such a decrease in the incidence of carcinoma of the cervix in the presence of prolapse of the uterus must be an argument against the theory that chronic irritation is a causative factor in the production of cervical carcinoma. No other type of cervix is exposed to the constant trauma, irritation, inflammation and infection as is the cervix of prolapsus. The author believes that this may be due to the drying out and cornification of the superficial epithelium which prevents not only growth but also development of carcinoma. It may be possible that the lack of secretion literally starves out malignant growths.

RALPH A. REIS.

Jorstad, Louis H., and Auer, Eugene S.: Histological Grading in Carcinoma of Uterine Cervix, *Surg. Gynec. Obst.* 57: 583, 1933.

Considerable interest has been aroused in regard to the significance of the grading of carcinoma since the publication of Broders' work in 1921. Broders has arbitrarily divided tumors into four grades.

Adverse criticism of grading is sometimes based on the fact that different grades are found in different portions of the same tumor and at different periods of growth there is a difference in the grade of the tumor. This may be due to the resistance of the host at varying periods of time. Additional adverse criticism is based on the personal equation.

Some clinicians have attempted to formulate conclusions in regard to the prognosis of cervical (uterine) cancer, based on the results of numerous studies on grading of carcinoma of the lower lip. It is impossible to use the lip as a basis of comparison for tumors of the cervix, simply on the assumption that in both instances we deal with surface epithelium.

From a comparison made of an unselected series of squamous cell carcinoma of the lower lip and squamous cell carcinoma of the cervix, it is clearly seen that the two are entirely dissimilar. In cancer of the lip we see 26 per cent of all cases in Grade I, whereas but 1.3 per cent of the cervical cancers are thus grouped.

Cancers of the cervix treated by radium alone have been arranged into clinical groups as well as microscopic grades, using the clinical grouping of the Schmitz classification, which divides cancer of the cervix into groups as follows: Group I, malignancy is confined to the uterine cervix; Group II, malignancy has spread to the adjacent vaginal wall; Group III, uterus is still movable, but there is beginning thickening of one or both broad ligaments; and Group IV, uterus is fixed.

From a study of this chart it seems evident that from a prognostic viewpoint clinical grouping and extent of disease is more important than grading. This signifies that grading alone is of no value although it is or may be of great value

in the radium treatment of a specific case of carcinoma of the cervix, in fact it may be the deciding factor in the decision to employ surgical treatment rather than radiation, or vice versa.

WILLIAM C. HENSKE.

Chambers, H.: Histological Classification of Cancers of Uterine Cervix and Relation of Growth Structure and the Results of Radium Treatment. *Am. J. Cancer* 23: 1, 1935.

The biopsy material from 728 cases of cancer of the cervix has been examined and 500 cases have been histologically graded, 228 being unsuitable for classification.

The results of treatment are recorded with special reference to local cure of the cancer at the primary site in relation to the histologic type. The highest percentage of local cures has been obtained in the transitional type of squamous cancer Grade III, 73.8 per cent, and in the adenocarcinomas, 72.9 per cent, but none of the histologic grades show a difference of more than 15 per cent in either local cure or in the number of three-year survivors. There is no evidence in this material that adenocarcinomas are insensitive to radiation.

HUGO EHRENFEST.

Items

New Officers of the American Gynecological Society Elected at the Hot Springs Meeting

President, Benjamin P. Watson, New York, N. Y.

Vice-Presidents, William A. Scott, Toronto, Canada, and John A. McGlinn, Philadelphia, Pa.

Treasurer, William C. Danforth, Evanston, Ill.

Secretary, Otto H. Schwarz, St. Louis, Mo.

Awards for Scientific Exhibits at Annual Meeting of the American Medical Association, Atlantic City, N. J., June, 1935

The Gold Medal to F. L. ADAIR and M. EDWARD DAVIS, Department of Obstetrics and Gynecology, University of Chicago, for original investigations in the development of ergot as a therapeutic agent and especially of a new active principle isolated in crystalline state from ergot, together with its pharmacologic and medicinal properties. An article describing this research in full will be published in the October issue of the JOURNAL.

AARON E. KANTER, CARL P. BAUER and ARTHUR H. KLAUANS, Rush Medical College of the University of Chicago, for exhibit illustrating a new biologic test for hormones in pregnancy urine.

Pacific Coast Society of Obstetrics and Gynecology

The Annual Meeting of the Pacific Coast Society of Obstetrics and Gynecology is to be held in Los Angeles, California, November 6 and 9, 1935.

Correspondence

The Value of the Bitterling Test for Pregnancy

IN A preliminary report rendered by Kanter, Bauer, and Klawans, substantial praise was given to a new test for pregnancy in which a fish, the Japanese bitterling, was utilized as the biologic test species. The test was presumably based on the reactivity of the ovipositor of this fish to an excess, probably, of the estrogenic hormone in the urine of pregnancy.* Normally, this ovipositor is readily seen in the female bitterling as a projection about 2 mm. long just anterior to the ventral fin. During the breeding season and (according to the authors) in response to approximately 40 to 120 mouse units of estrin in pregnancy urine, this ovipositor enlarges to between 15 and 25 mm. in length, so that it is easily visible. The many advantages cited over the usual pregnancy tests, led us to investigate its potentialities.

At the outset of our experimentation we were impressed by the apparent impracticability of the "bitterling test," both because of the heavy mortality of the fish attendant upon their handling and because of the impossibility of standardizing the specimens as required in the original article. We were fortunate in securing a quantity of these fish through the cooperation of the Bureau of Fisheries in Washington, through whose efforts we were placed in contact with importers in San Francisco. In the first shipment a high mortality resulted notwithstanding consultation with the Bureau of Fisheries. About ten survived but these too, succumbed after some preliminary work in testing. To our surprise, when our second shipment arrived, twenty out of ninety-seven already showed a visible elongation of the ovipositor. This unaccountable feature subsided, however, after twenty-four hours in our tanks.

The standardization process referred to in the original article was attempted, but very early in our work the futility of it was recognized. The process required that we select only those fish which reacted positively to positive urine and negatively to negative urine. The test is presumably based on stimulating the ovipositor with estrogenic substance; the quantity which should yield a positive test is, according to the authors, 40 to 120 mouse units. It is our contention that this estimate is much too high, that much smaller quantities of estrin will yield a positive test. Not only may there be an individual sensitivity in the fish, but even this is variable according to factors as yet undiscovered by the authors of the original article or by ourselves. In fact, 4 c.c. of urine, which is the quantity used in the test, will yield only 20 mouse units at the beginning of pregnancy and about 40 mouse units at its termination.

When we checked the urine of regularly menstruating, nonpregnant women, in whom 4 c.c. would yield only 0.4 to 0.8 of a mouse unit of estrin, our results were quite unexpected. In nine definitely negative cases as checked clinically and by the Aschheim-Zondek reaction, seven were strongly positive according to the "bitterling test," one moderately positive and only one negative. The negative

*Kanter, A. E., Bauer, C. P., and Klawans, A. H.: A New Biologic Test for Hormones in Pregnancy Urine, *J. A. M. A.* **103**: 2026, 1934.

test was obtained in a fish that died within the first twenty-four hours of the test, and it is quite possible that this occurred before it had a chance to react.

In normal, healthy human males, the urinary output of the male sex hormone in 4 c.c. of urine would be only 2 mouse units. Yet witness the effrontery of this foreign visitor in slandering ten of our male citizenry by declaring six of them strongly positive and two moderately so. The other two fish died. The male hormone, it might be added, while chemically related, is biologically identical with the female sex hormone.

Twelve cases of well-advanced pregnancy were then submitted to the "bitterling test." The A-Z test in all these cases was, as usual, definitely positive. In the "bitterling test," six were strongly positive, four only moderately so, one was negative and one died a negative.

Three cases of hydatid mole were tested on five fish, of which two died at once. One gave a negative reaction, although here again, the A-Z test was positive, and two of the fish gave strongly positive results.

Thus we see positive reactions in the presence of very minute quantities of estrin and in one instance, where transportation alone excited growth of the ovipositor. There is no apparent gradation in reaction as witness the great number of positive tests in the nonpregnant and in the male as well as the variability of reaction in definitely positive urines. Since the quantity necessary for a positive reaction is so infinitely small, the value of this test begins to shrink to negligible proportions. One of us (Kotz) has recently shown there is a marked increase of estrin in the urine in cases of functional dysmenorrhea. Here again, a positive pregnancy test would only confuse the diagnosis.

Thus in summary we may state that thirty-six tests were performed on these Japanese bitterlings in an attempt to standardize this fish for use in biologic pregnancy tests. Twelve known positive urines yielded six strongly positive, four moderately positive, one questionable negative reaction. Nine definitely negative cases yielded seven strongly positive results and only one negative. Ten male urines yielded eight strongly positive, one questionable positive test for pregnancy. The results in hydatidiform mole were conflicting. Therefore we believe this test to be of no practical value in the determination of pregnancy. It is based on an incorrect premise that the fish will yield positive results only in the presence of 40 to 120 mouse units of estrin. Were these figures correct, the test as published would be positive only in the later periods of gestation. As a matter of fact, these fish react to much smaller quantities. Standardization of the fish has been a hopeless gesture in our hands, although we followed the published technic and used the exact species of fish as advocated in the original article.

A test using a tropical fish is impractical, even if the test itself is of value. The fish are not easy to handle and have a heavy mortality rate, making them more expensive in the long run than mice.

A biologic pregnancy test based on small amounts of increase in urinary estrin is of no value as the possibilities of error in allied causes with some estrin increase, such as dysmenorrhea, are great and limit its usefulness.

In our own experience we have found the Aschheim-Zondek and the Friedman tests useful and dependable diagnostic aids and not prohibitive from an economic point of view.

J. KOTZ, F.A.C.S., M.D.

H. S. DOUGLAS, A.B., M.D.

E. PARKER, A.B., M.A., M.D.

GEORGE WASHINGTON UNIVERSITY MEDICAL SCHOOL.
DIVISION OF ENDOCRINOLOGY
WASHINGTON, D. C.

Technic Fothergill Operation

To the Editor:

IN THE February issue of this JOURNAL (page 240) Dr. Robert T. Frank describes in considerable detail and with excellent illustrations, the technic of the Fothergill operation. I, too, have had considerable experience with this procedure and wish to call attention to a minor, but to my mind very important, difference in the method of placing the sutures to draw the flaps into the cervical canal.

In Fig. 1 A (one half of Dr. Frank's Fig. 4) suture number 1 is shown passing *under* the edge of the flap of vaginal mucosa, the "bite" being on the surface. In Fig. 1 B is shown the method I use. The suture is brought *over* the edge of the flap and the "bite" is underneath. In Fig. 2 A is shown in longitudinal section what happens with Dr. Frank's technic, and in Fig. 2 B with mine, when the suture is tightened and the flaps are drawn into the cervical canal. With his technic the edges of the flaps are everted and puckered up. This is counterbalanced to some extent by the insertion of the packing which pushes down and holds the

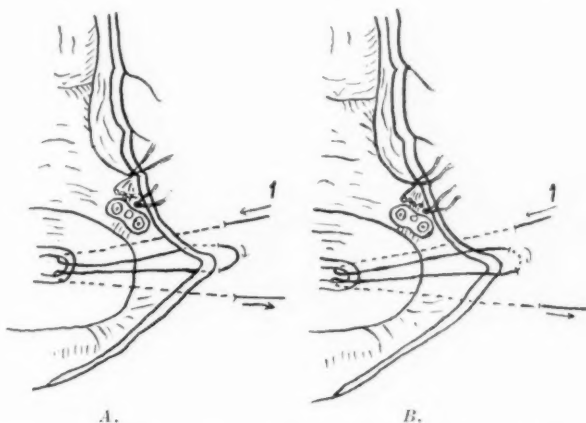


Fig. 1.—A shows Dr. Frank's method of passing sutures under the edge of the mucosal flap. B shows the suture passed over the edge of the flap.

edges flat against the walls of the cervical canal. As this canal is lined by mucosa which has been curetted away, perhaps completely, perhaps not, there is no certainty that the raw undersurfaces will adhere firmly in the four days that the packing is allowed to remain. If they should not adhere firmly, they will, on withdrawing the packing, evert again. This is avoided entirely by my method because the sutures by passing over the edges hold them down in close apposition to the canal walls for the life of the suture (ordinarily 10-day catgut). This same principle applies to all four sutures.

I can corroborate all that Dr. Frank has said about the results of the operation except in third-degree prolapse. A careful study of the follow-up results in a series of nine hundred cases of vaginal plastics has convinced me that it is impossible to evaluate results under twenty-four months of observation. A large part of Dr. Frank's sixty-seven cases is less than two years old and there are only eleven cases of third degree prolapse all told among them. Dr. Frank has probably only half a dozen or so third-degree prolapse cases (a rather small number) which have been observed long enough for critical purposes. I fear that he may have jumped at conclusions which he will be compelled to revise later. I, too, was en-

thusiastic at first but further observation of some of these same cases has raised an element of doubt in my mind, and I prefer to reserve judgment until a larger number of cases has been observed sufficiently to warrant the expression of an opinion.

This operation in suitable cases has certain additional advantages which Dr. Frank did not sufficiently emphasize. They are (1) it is very easy to teach to

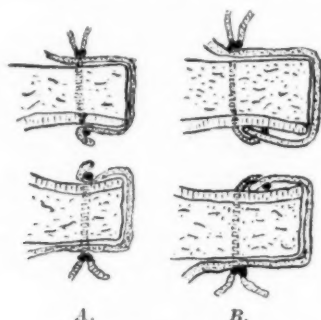


Fig. 2.—*A*, when the suture is tightened the edges of the flap are everted and puckered in Dr. Frank's method. *B*, in this method the suture holds the edges of the flap smoothly against the walls of the cervical canal.

junior staff men. (2) It can be done rapidly; thirty minutes is ample time. (3) One procedure takes care of cystocele, cervix and prolapse and any type of perineorrhaphy can be combined with it. (4) Even a poor operator can learn it and get better results with it than with most other operations for prolapse.

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Guthmann, H., and Stahler, F.: The Influence of the Position and Function of the Intestinal Canal During Normal Pregnancy, Monatsch. Geburtsh. u. Gynäk. 93: 327, 1933.

The authors examined 23 healthy gravid women between the seventh and tenth month to determine the changes which occurred in the position and function of the intestinal canal. They found that there was a diminution in the tonus of the entire gastrointestinal tract. The gravid uterus acts on all parts of this tract as a dislocating organ. The parts mostly involved are the stomach, the last loops of the ileum, the lower sigmoid, and the rectum. The cardiac end of the stomach became relaxed and was less able to contract and this explains the frequent occurrence of heartburn in pregnancy. In one case of severe vomiting of pregnancy, there was a cardiospasm in the presence of hypotonicity of the esophagus. In the second half of gestation, the lower pole of the cecum is a handbreadth higher and about 2 fingers more laterally than in the nonpregnant state. Therefore, the appendix is dislocated accordingly. The time required for the passage of the intestinal contents is normal up to the sigmoid but in this organ there is a block. Hence constipation in pregnancy is mostly rectal in origin.

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